Erratum:

There is an error in the summary information on pelagic longline fishing effort observer coverage presented in Table 2 of this report. The row and grand totals is Table 2a and 2b for the year 2001 were incorrect. The attached pages include the corrected table 2 and a correction to the text on page 8 (Results and Discussion) describing overall observer coverage during 2001. The attached pages should replace the original versions in NOAA Technical Memorandum NMFS-SEFSC-515.

all takes of marine mammals from 2001-2002 were reviewed and serious injury determinations were verified based upon observer comments and photographs consistent with current NOAA fisheries guidelines.

Sea Turtle Life History Form

During 2001-2002, detailed information on the characteristics of longline interactions with sea turtles has been recorded by the fisheries observers. Information included on the form includes detailed descriptions of the type of interaction, the extent of entanglement, the location of any hook attached to the animal or swallowed, and other data (Appendix A). Information on entanglement, hooked animals, and the location of hooks are summarized in this report.

Results and Discussion

Reported Fishing Effort and Observer Coverage

The total reported pelagic longline fishing effort included 6.76 and 6.02 million hooks during 2001 and 2002, respectively (Table 1a). The reported fishery effort included 10,758 sets during 2001, and of these 584 were observed by the POP program for an overall coverage of 5.4% (Table 1, Table 2, Figure 2). In 2002, 9,614 sets were reported, and 856 were observed for an average coverage of 8.9% (Table 1, Table 2). Observer coverage for specific year-area-quarter strata typically ranged between 2-6% of reported sets (Table 3). However, there was virtually no coverage of the SAR, TUN, and TUS geographic areas (Figure 2).

The coverage during the NED experimental fishery in the 3rd and 4th quarters of each year was 100% of the reported effort (Table 3) consistent with the design of the

Table 2. Pelagic longline fishing effort observed during 2001-2002 by year, quarter, and fishing area (Figure 1). Fishing effort is reported as A) Number of Hooks and B) Number of sets. NED-E indicates the NED experimental fishery.

A. Number of Hooks (x1000)

Year	Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	NED-E	SAB	SAR	TUN	TUS	Total
2001	1	9.0	2.3	31.4	2.6	0	0	0	-	9.2	0	0	0	54.6
2001	2	0	3.9	52.2	17.1	12.1	8.8	0	-	16.1	0	0	0	110.2
2001	3	0	2.2	42.5	7.6	0.0	5.7	0	71.9	6.9	0	0	0	136.8
2001	4	0	1.3	26.9	22.4	0.0	5.8	-	92.7	4.3	0	0	0	153.4
Total By Region		9.0	9.7	153.0	49.7	12.1	20.3	0	164.6	36.5	0	0	0	455.1
2002	1	5.8	34.2	27.8	4.8	8.0	0	0	-	0	0	0	0	80.6
2002	2	2.4	8.9	34.7	9.8	0	6.3	0	-	14.3	0.8	0	0	77.1
2002	3	0	4.9	33.7	10.8	0	0.0	-	301.9	0	0	0	0	351.2
2002	4	8.3	0.0	22.9	21.6	0	4.2	-	139.9	0.9	0	0	0	197.8
Total By Region		16.5	48.0	119.0	46.9	8.0	10.5	0	441.9	15.2	0.8	0	0	706.7

B. Number of Sets

Year	Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	NED-E	SAB	SAR	TUN	TUS	Total
2001	1	10	7	47	4	0	0	0	-	13	0	0	0	81
2001	2	0	7	66	21	15	10	0	-	25	0	0	0	144
2001	3	0	5	56	9	0	6	0	80	20	0	0	0	176
2001	4	0	2	29	28	0	7	-	106	11	0	0	0	183
Total By Region		10	21	198	62	15	23	0	186	69	0	0	0	584
2002	1	8	40	33	5	12	0	0	-	0	0	0	0	98
2002	2	3	10	40	16	0	11	0	-	15	1	0	0	96
2002	3	0	14	46	11	0	0	-	343	0	0	0	0	417
2002	4	10	0	36	27	0	5	-	160	2	0	0	0	245
Total By Region		21	64	155	59	12	16	0	503	17	1	0	0	856

NOAA TECHNICAL MEMORANDUM NMFS-SEFSC-515

Estimated Bycatch of Marine Mammals and Turtles in the U.S. Atlantic Pelagic Longline Fleet During 2001-2002.

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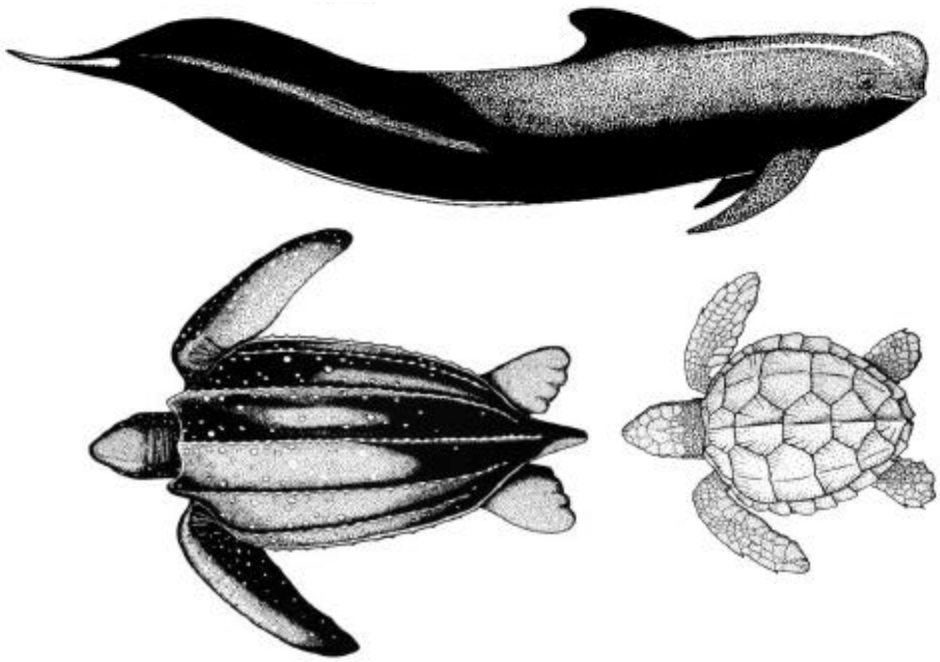

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December 2003

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Abstract

The U.S. Atlantic pelagic longline fleet operates throughout the Gulf of Mexico, along the entire U.S. Atlantic coast over the continental shelf and slope, and in distant water areas including the central North Atlantic and the Canadian Grand Banks. The Atlantic longline fleet is defined as a Category I fishery under the Marine Mammal Protection Act, and it is also the subject of management concerns under the Endangered Species Act due to interactions with marine turtles including leatherback and loggerhead turtles. Using data from the pelagic longline fishery observer program and a mandatory fishery logbook reporting program, total bycatch of marine mammals and turtles in the longline fishery was estimated for 2001 and 2002. A delta-lognormal approach was applied to estimate region specific and total annual interactions and mortality for the fishery. Total interactions observed during an experimental fishery in waters off of the Canadian Grand Banks are also documented. The primary marine mammal species interacting with this fishery were pilot whales (*Globicephala sp*.) and Risso's dolphin (*Grampus griseus*). There were also significant interactions with leatherback turtles (*Dermochelys coriacea*) and loggerhead turtles (*Caretta caretta*) during both years. Potential sources of bias and uncertainty in these bycatch estimates are discussed.

TABLE OF CONTENTS

Introduction

Pelagic longline fisheries operate throughout the world's oceans targeting large pelagic fish predators including swordfish, tunas, and sharks. The U.S. Atlantic pelagic longline fleet operates throughout the Gulf of Mexico, along the entire U.S. Atlantic coast over the continental shelf and slope, and in distant water areas including the central North Atlantic and the Canadian Grand Banks (Figure 1). Because longline fisheries use relatively non-selective fishing gear, the U.S. east coast fishery has long been the focus of bycatch reduction efforts for non-target fish species (e.g., billfish Goodyear, 1999), marine turtles (Witzell, 1999), and marine mammals (Johnson *et al.*, 1999). The Atlantic longline fleet is defined as a Category I fishery under the Marine Mammal Protection Act (50 CFR Part 229, Federal Register Vol. 69, No. 135, 15 July 2003) due to frequently documented interactions with marine mammals. The fishery is also the subject of management concerns under the Endangered Species Act due to frequent interactions with marine turtles including leatherback (*Dermochelys coriacea*) and loggerhead turtles (*Caretta caretta*).

Due to the interactions with protected resources and additional bycatch of recreationally important finfish, the pelagic longline fishery has had an extensive fishery observer program (Pelagic Observer Program, POP) in place since 1992 to document finfish bycatch, characterize fishery behavior, and quantify the interactions with protected species (Lee and Brown, 1998). In addition, a mandatory fishery logbook system (FLS) has been in place since 1992 requiring boat captains to report fishing effort, gear characteristics, and commercial catch (Cramer and Adams, 2001). Thus, there is

extensive information available on both the absolute level of effort in this fishery and bycatch rates of protected species. These data have been used to generate annual estimates of marine mammal and turtle bycatch (Johnson *et al.*, 1999; Yeung, 1999a; Yeung 1999b; Yeung, 2001).

Management actions have resulted in significant changes in the behavior of the fishery since 2001. The Northeast Distant (NED) water component of the fishery that operated in international waters off the Canadian Grand Banks and near the Azores Islands was closed to fishing effort on June 1, 2001 (Figure 1 Label E, 50 CFR Part 635, NMFS 2003). An experimental program was conducted during September – December 2001 and July – November 2002 in which the effects of gear characteristics, environmental factors, and fishing practices on marine turtle bycatch rates were evaluated. During this experimental fishery, observers were aboard all pelagic longline fishing vessels operating in the NED area, and all fishery sets were conducted in accordance with an experimental design.

Several additional time-area closures have been introduced into the fishery due to concerns over both finfish and protected species bycatch (NMFS 2003, 50 CFR Part 635). These include year-round closures near the Desoto canyon in the Gulf of Mexico after November 1, 2000 (Figure 1, Label A), and in waters off the Atlantic coast of Florida after March 1, 2001 (Figure 1, Label B). Seasonal closures are in effect in the Charleston Bump region between February 1 and April 30 (Figure 1, Label C), and a bluefin tuna area off of the New Jersey coast between June 1- to June 30 (Figure 1, Label

D). These closures have resulted in both a redistribution and decline in the total effort in the fishery.

In this report, marine mammal and marine turtle bycatch estimates are calculated for pelagic longline fishery effort during 2001-2002, including those interactions occurring during the NED experimental fishery. Bycatch rates (catch per hook) are quantified based upon observer data by year, fishing area, and quarter. The estimated bycatch rate is then multiplied by the total fishing effort (number of hooks) reported to the mandatory FLS program to obtain estimates of total interactions for each species of marine mammal and turtle.

Methodology

Geographic Stratification and Pooling

Fishery observer effort is allocated among 11 large geographic areas and calendar quarter based upon the historical fishing range of the fleet (Figure 1). The target annual coverage has traditionally been 5% of the total reported sets, and observer effort is allocated randomly based upon reported fishing effort (Lee and Brown, 1998). The bycatch estimates developed for each species here are therefore stratified by year, geographic area, and quarter to reflect the design of the observer program.

In previous estimates of turtle and marine mammal bycatch, strata with reported effort lacking observer coverage were pooled when the number of observed sets in the stratum was <5 (Yeung, 2001; Yeung *et al.* 2000). Based upon the results of a generalized linear model exercise, strata were first pooled across quarters, years, and then

into larger geographic areas. Annual total estimated bycatch was generally not sensitive to decisions regarding the pooling strategy. However, any pooling strategy necessarily creates potential biases in the estimation of total mortality for particular strata.

Offshore waters in the SAR, TUN, and TUS regions have only rarely been included in the POP observer coverage. Due to this very limited coverage, previous pooling schemes have typically resulted in pooling across all offshore strata to include the NED and NCA regions into an "other Atlantic" stratum (e.g., Yeung, 1999b; Johnson *et al.* 1999). The pooling criteria thus resulted in the development of spatially and temporally coarse estimates of total bycatch of protected resources. For example, the only bycatch estimates specific to the NED area were developed for 1999 and 2000 (Yeung, 2001) despite consistent and long term coverage of this area during at least the 3rd and 4th quarters between 1992-1997 (Johnson *et al.*, 1999). The pooling strategy resulted in combining geographic areas extending between 5-55° N latitude in the central north Atlantic.

An alternative approach was employed in the current analysis to avoid pooling across geographic areas and quarters. Seasonal changes in temperature and large scale biogeographic processes govern the availability of both marine mammals and sea turtles to the pelagic longline fishery. Thus, observed bycatch is expected to be strongly influenced by time of year (quarter) and geographic region. In contrast, both marine mammals and sea turtles are relatively long-lived, and their population sizes are less likely to undergo large interannual fluctuations, and it is therefore expected that interannual differences in bycatch rate within quarters and geographic area strata are likely to be small.

Bycatch rates for year-quarter-area strata with >10 reported longline fishery sets that had no corresponding observer coverage were replaced with the mean bycatch rate observed in the quarter-area stratum across the previous 5 years. For some cells, there has been no historical observer coverage within the previous 5 years. In these cases, no bycatch estimate was made, and these strata are identified as potential sources of negative bias in the regional and annual estimates for 2001 and 2002. This approach avoided the potential biases associated with pooling across geographic strata while allowing bycatch estimates for the majority of unobserved strata.

Delta Estimator

Sets in which a portion of the longline broke away and therefore had multiple recorded haul times were combined into single sets, consistent with the approach of the most recent mortality estimate (Yeung, 2001). The mean and variance of catch rates for marine mammals and turtles in observed longline sets was calculated using a delta estimator (Pennington 1993). The delta estimator is more appropriate than the simple mean because catch rates are generally log-normally distributed and bycatch events are rare. The unit of effort in this analysis is the number of hooks, consistent with methods used to estimate total catch and bycatch of finfish and previous analyses of protected resource interactions (Johnson *et al.* 1999). The delta mean bycatch rate for each analytical stratum, t, is calculated as:

$$(1) \quad C_t = \frac{m_t}{n_t} e^{L_t} G\left(s_{L_t}^2 / 2\right),$$

where:

m_t is the number of sets with observed bycatch,

n_t is the total number of observed sets,

L_t is the mean of the log-transformed number of animals taken per 1000 hooks when bycatch occurred.

s_L^2 is the observed sample variance of the log transformed bycatch rate, and

G is the cumulative probability function from the Poisson distribution given as:

$$(2)\quad G\left(s_L^2/2\right)=1+\frac{m_t-1}{m_t}\left(s_L^2/2\right)+\sum_{j=2}^{\infty}\frac{\left(m_t-1\right)^{2j-1}}{m_t^{j}\left(m_t+1\right)\left(m_t+3\right)....\left(m_t+2j-3\right)}\times\frac{\left(s_L^2/2\right)^{j}}{j!}.$$

The series was computed numerically over j terms until meeting a convergence criterion of a change in the function value of < 0.0001 with additional terms (j). Convergence was generally achieved with <10 terms. The variance of the delta estimator is:

$$(3)\quad \mathrm{var}(C_t)=\frac{m_t}{n_t}\left(e^{2L_t}\right)\left[\frac{m_t}{n_t}G^2\left(s_L^2/2\right)-\left(\frac{m_t-1}{n_t-1}\right)G\left(\frac{m-2}{m-1}s_L^2\right)\right].$$

When m_t is equal to 1, the mean bycatch rate reduces to the simple mean rate where

$$(4)\quad C_t=\frac{\exp(L_t)}{n_t},$$

and

$$(5)\quad \mathrm{var}(C_t)=\left(\frac{\exp(L_t)}{n_t}\right)^2.$$

The C_t calculated above gives the mean number of animals killed per 1000 hooks in the observed trips. To estimate total interactions, *N*, these rates are multiplied by the total number of hooks reported to the FLS database for each analytical stratum. The stratified estimates and associated variances were summed to provide annual estimates

for each species. Approximate 95% confidence intervals were calculated assuming lognormal distribution of total mortality as N/C and $N \cdot C$ for the lower and upper confidence bounds respectively where:

$$(6) \qquad C = \exp\left[z_a \sqrt{\mathrm{var}(\ln N)} \right],$$

and

$$(7)\ \mathrm{var}(\ln N) = \ln\left[1 + \mathrm{var}(N) / N^2 \right],$$

where z_a is 1.906, the z score for a = 0.05.

Marine Mammal Serious Injury Determination

The Marine Mammal Protection Act (MMPA) requires that mortality and serious injury of marine mammals incidental to commercial fishing operations be reduced below potential biological removal (PBR). "Serious injury" has been defined as an injury likely to result in mortality (NOAA Fisheries 50 CFR 229.2, Angliss and DeMaster, 1998). A workshop of NOAA Fisheries and external experts was convened in 1997 to evaluate the types of injuries occurring in commercial fisheries and guidelines for determining if a given marine mammal observed interacting with commercial fishing gear was seriously injured. For small cetaceans, including pilot whales and other delphinids, it was concluded that animals that ingested hooks, were released with significant amounts of trailing fishing gear, were swimming abnormally, or suffered some obvious severe external trauma should be considered seriously injured (Angliss and Demaster, 1998). Serious injury determinations are to be made on a case by case basis after reviewing the observations and comments of fishery observers. For this study, observer comments for

all takes of marine mammals from 2001-2002 were reviewed and serious injury determinations were verified based upon observer comments and photographs consistent with current NOAA fisheries guidelines.

Sea Turtle Life History Form

During 2001-2002, detailed information on the characteristics of longline interactions with sea turtles has been recorded by the fisheries observers. Information included on the form includes detailed descriptions of the type of interaction, the extent of entanglement, the location of any hook attached to the animal or swallowed, and other data (Appendix A). Information on entanglement, hooked animals, and the location of hooks are summarized in this report.

Results and Discussion

Reported Fishing Effort and Observer Coverage

The total reported pelagic longline fishing effort included 6.76 and 6.02 million hooks during 2001 and 2002, respectively (Table 1a). The reported fishery effort included 10,758 sets during 2001, and of these 403 were observed by the POP program for an overall coverage of 3.7% (Table 1, Table 2, Figure 2). In 2002, 9,614 sets were reported, and 856 were observed for an average coverage of 8.9% (Table 1, Table 2). Observer coverage for specific year-area-quarter strata typically ranged between 2-6% of reported sets (Table 3). However, there was virtually no coverage of the SAR, TUN, and TUS geographic areas (Figure 2).

The coverage during the NED experimental fishery in the 3rd and 4th quarters of each year was 100% of the reported effort (Table 3) consistent with the design of the

experimental fishery. However, during the period between the closure of this area and the initiation of the experimental fishery there is reported non-experimental fishing effort during both the 2nd and 3rd quarters of 2001 (Table 1). Due to the differences between the behavior of the experimental fishery and the normal fishing effort, separate bycatch rates for standard (NED) and experimental (NED-E) effort were estimated based upon available observer coverage in previous years.

The area-quarter strata with >10 reported sets in each and no associated observer coverage are identified in Table 3. Observer coverage was available for the majority of these within the previous five years with the exception of NED-Quarter 1, NCA-Quarter 3, and NEC-Quarter 1. There has been very little historical observer coverage of the SAR, TUN, and TUS areas, and therefore no bycatch estimate is possible for these geographic areas.

Observed Protected Species Interactions

A total of 16 and 24 interactions were observed with marine mammals were observed during 2001 and 2002, respectively (Table 4a, Figure 3). The majority of these interactions were observed in the MAB region, followed by the experimental NED fishery. There were 273 and 335 observed interactions with marine turtles, with the vast majority of these occurring during the experimental NED fishery (Table 4b, Figure 4). The greatest number of turtle takes during non-experimental fishing effort occurred in the GOM region during the 2nd and 3rd quarters (Table 4b).

The majority of interactions with marine mammals were with pilot whales (*Globicephala sp.*) and Risso's dolphin (*Grampus griseus*). Addition interactions were

observed with striped dolphin (*Stenella coeruleoalba*), common dolphin (*Delphinus delphis*), northern bottlenose whale (*Hyperoodon sp.*) and two un-identified mammals (Table 5, Figure 3). During 2001, 2 marine mammals were observed to have died and 11 were seriously injured. No mammal mortalities were observed during 2002, but there were 9 serious injury determinations. The most common serious injury type involved being released with a significant amount of entangling gear. Typically, the serious injuries involved interactions with the gangion line or hook leaders.

One loggerhead turtle was observed to have been killed during 2001 and one leatherback was observed dead during 2002 (Table 6a). The vast majority of the remaining turtles in each year where characterized as being released alive and injured based upon recorded information on the sea turtle life history form (Table 6a), and the majority of these were hooked (Table 6b). Leatherback turtles were most typically hooked in the front flipper in both years, while loggerhead turtles more often swallowed the hook or were hooked in the mouth (Table 6b). In the NED experimental fishery, the majority of fishing gear (hooks and line) were removed prior to release, with the exception of turtles that swallowed hooks. For those cases, the trailing line was generally removed from the turtle before release.

Total Estimated Bycatch and Mortality

Observed marine mammal and turtle interactions for individual longline sets are listed in Appendix B. The year-quarter-area strata estimates for marine mammal mortality, serious injury, and live releases are presented in Table 7a-d. The majority of marine mammal serious injury and mortality occurred in the mid-Atlantic bight region

during the second quarter (Table 7c, Figure 3). Pilot whales and Risso's dolphin were the only marine mammal species with observed interactions and mortality during non-experimental fishery effort.

Stratum estimates of mortality and total interactions for marine turtles are shown in Table 8. During 2001, high incidental takes of leatherback turtles occurred during Quarter 1 in the FEC (253.5 estimated interactions), and in the Gulf of Mexico during the 2nd and 3rd quarters (180.1 and 157.0 takes respectively). Leatherback interactions during 2002 were dominated by the Gulf of Mexico region with high takes during the 2nd – 4th quarters (Table 8c, Figure 4).

For loggerhead turtles, the highest takes occurred during the 3rd Quarter in the NEC area during 2001 (105.8 takes), and in both the NEC (104.3 takes) and GOM (130.7) during the 2nd quarter of 2002 (Table 8c, Figure 4).

The average bycatch rates and estimated catches in strata that were not observed during 2001 or 2002 across the previous 5 years are summarized in Table 9. In several cases, a significant number of additional takes of both marine mammals and sea turtles are estimated to have occurred in unobserved strata. The most notable of these for turtles are the NED (2001 Quarter 3), NEC (2002 Quarter 3), and SAB (2002 Quarters 1 and 3).

A total of 70.2 (29.3-168.0 95% CI) pilot whales and 69.3 (25.2-191.1 95% CI) Risso's dolphin are estimated to have suffered serious injury or mortality in the longline fishery during 2001 (Table 10a). The total annual estimated mortality and serious injury in 2002 was 53.9 (23.4-124.0 95% CI) for pilot whales and 28.4 (8.8-91.4) Risso's dolphins (Table 10a). There were an additional 4 documented serious injuries of Risso's dolphin during the NED experiment in 2001 and 3 in 2002 (Table 10b).

There were estimated to be a total of 1208.4 (851.1 – 1715.8 95% CI) interactions with leatherback turtles during 2001 and 962.3 (707.8 – 1308.2 95% CI) during 2002 (Table 11a). In 2001, the majority of leatherback interactions occurred in the FEC, GOM, SAB, and MAB regions. During 2002, the interactions with leatherback turtles were very high (694.6 animals) in the Gulf of Mexico. In other regions, 2002 levels were considerably lower than 2001 (Table 11a).

For loggerhead turtles, there was an estimated total of 311.8 (154.5 – 629.3 95% CI) interactions during 2001 and 574.6 (418.9 – 788.3 95% CI) during 2002. The majority of these interactions occurred in the NEC during 2001 and in the NEC, GOM, FEC, and MAB during 2002 (Table 11b). During the NED experimental fishery, there were an additional 77 and 158 interactions with leatherback turtles during 2001 and 2002 (Table 12). There were 142 and 100 interactions in 2001 and 2002 with loggerheads during the NED experiment (Table 12).

Sources of Bias and Uncertainty

The fishery logbook data is a mandatory reporting program, and thus it is expected that reporting rates are generally high. Due to the intense management focus on the longline fishery, there has been close monitoring of reporting rates, and observed trips can be directly linked to reported effort. In general, the gear characteristics and amount of observed effort is consistent with the reported effort. However, underreporting is possible in this fishery and would result in a direct negative bias in bycatch estimates.

Observer coverage in the pelagic longline fishery is generally high, particularly in comparison to that of other commercial fisheries. The sampling level, on average, is

sufficient to provide reasonable quantification of interactions with protected species. However, in some strata there is little or no coverage during particular times of year. During 2002, the most notable gaps in coverage occurred in the NEC and SAB regions where there were significant amounts of reported fishing effort. The estimated bycatch based upon previous years observer coverage contributed significant numbers of takes for these strata. While strata estimates were not pooled in cases of missing observer coverae, applying observer data from previous years is inherently uncertain since bycatch rates can vary strongly in time and space. Estimates for those strata supplemented by previous observer coverage should therefore be treated with caution.

For some strata, there has been no recent observer coverage, and thus regional and annual estimates of bycatch are potentially negatively biased. The most glaring omission is the generally low current and historical coverage of the offshore areas including the SAR, TUN, and TUS regions. Observer coverage in the NCA was also low during 2001 and 2002. These offshore strata traditionally have low levels of observer coverage, and therefore it is currently unknown if there are significant interactions with protected species in these sectors of the longline fishery.

The delta estimator was applied to calculate bycatch rates primarily to maintain consistency with previous estimates for this fishery (Johnson *et al.*, 1999, Yeung, 1999a; Yeung, 1999b; Yeung, 2001). This approach assumes 1) that catch rates (animals per hook) are lognormally distributed and 2) that the number of hooks is an appropriate unit of effort. The first assumption was critically examined for turtles in Johnson *et al.* (1999); however, is difficult to verify for marine mammals given the generally low rate of these interactions. The delta estimator is sensitive to the assumption of log-normality,

and violations of this assumption may result in biased (positive or negative) estimates of catch rate and associated variances. The second assumption has not been examined critically in previous analyses. The current approach assumes that total bycatch is linearly related to the total number of hooks fished. If this assumption is not correct, for example if there are saturation effects resulting in a non-linear relationship between the number of hooks and total catch, then there is potentially a direct bias in the estimate of total bycatch. This assumption is currently being evaluated along with other potential units of effort and statistical approaches to avoid bias and improve precision in bycatch estimates for the pelagic longline fleet.

Literature Cited

Angliss, R.P. and D.P. DeMaster. 1998. Differentiating serious and non-serious injury of marine mammals taken incidental to commercial fishing operations. NOAA Technical Memorandum NMFS-OPR-13, 48 pp.

Cramer, J. and H. Adams. 2001. Large pelagic logbook newsletter – 1999. NOAA Technical Memorandum NMFS-SEFSC-452, 26p.

Goodyear, C.P. 1999. An analysis of the possible utility of time-area closures to minimize billfish bycatch by U.S. pelagic longlines. Fishery Bulletin U.S. 97: 243-255.

Johnson, D.R., C. Yeung, and C.A. Brown. 1999. Estimates of marine mammal and marine turtle bycatch by the U.S. Atlantic pelagic longline fleet in 1992-1997. NOAA Technical Memorandum NMFS-SEFSC-418, 70p.

Lee, D.W. and C.J. Brown. 1998. SEFSC pelagic observer program data summary for 1992-1996. NOAA Technical Memorandum NMFS-SEFSC-408, 21p.

NMFS. 2003. Guide for complying with the regulations for Atlantic tunas, swordfish, sharks, and billfish. September 2003. http://www.nmfs.noaa.gov/sfa/hms/2003_ComplianceGuide.pdf

Pennington, M. 1983. Efficient estimators of abundance for fish and plankton surveys. Biometrics 39: 281-286.

Witzell, W.W. 1999. Distribution and relative abundance of sea turtles caught incidentally in the U.S. pelagic longline fleet in the western North Atlantic Ocean. Fish. Bull. U.S. 97: 200-211.

Yeung, C. 1999a. Revised mortality estimates of marine mammal bycatch by the U.S. Atlantic pelagic longline fleet in 1992-1997 based on serious injury guidelines. NOAA Technical Memorandum NMFS-SEFSC-429, 23p.

Yeung, C. 1999b. Estimates of marine mammal and marine turtle bycatch by the U.S. Atlantic pelagic longline fleet in 1998. NOAA Technical Memorandum NMFS-SEFSC-430, 26 p.

Yeung, C. 2001. Estimates of marine mammal and marine turtle bycatch by the U.S. Atlantic pelagic longline fleet in 1999-2000. NOAA Technical Memorandum NMFS-SEFSC-467.

Yeung, C., S. Epperly, and C.A. Brown. 2000. Preliminary revised estimates of marine mammal and marine turtle bycatch by the U.S. Atlantic pelagic longline fleet, 1992-1998. NMFS-SEFSC Miami Laboratory Ref. Doc. 99/00-13.

List of Tables and Figures

both years was equal to the total fishing effort, the observed interactions represents the total interactions for the experimental fishery.

Table 9. Estimated interactions in the pelagic longline fishery for strata with reported effort but no observer coverage during 2001 and 2002. Bycatch rates are the average of the stratum rates during the previous five years when observer coverage occurred. No live releases (not seriously injured) of marine mammals were observed in these strata during the previous 5 years. Estimates are presented only for strata with observed bycatch of each species.

Table 10. Total mortalities and serious injuries of marine mammals in pelagic longline sets. Mortality from pelagic longline fishery (A) is estimated by summing across individual strata estimates and estimates from unobserved strata. Serious injury, mortality, and live releases from the NED experimental fishery (B) reflect total bycatch during 100% observer coverage.

Table 11. Estimated interactions with marine turtles in pelagic longline sets for (A) Leatherback turtle and (B) Loggerhead turtles summarized by year and geographic area. * indicates regions with reported effort where no estimate is possible during at least one quarter.

Table 12. Total interactions with marine turtles during the 2001 and 2002 NED experimental fishery. All turtles captured during experimental sets were released alive.

Figure 1. Pelagic longline fishing areas in the north Atlantic ocean indicating 11 defined fishing areas. CAR = Caribbean, GOM = Gulf of Mexico, FEC = Florida East Coast, SAB = South Atlantic Bight, SAR = Sargasso Sea, MAB = Mid-Atlantic bight, NEC = Northeast Coastal, NED = Northeast Distant, NCA = North Central Atlantic, TUN = Tuna North, TUS = Tuna South. Pelagic longline closed areas are indicated by shaded polygons and letter labels (A-E).

Figure 2. Pelagic longline fishing effort during (A) 2001 and (B) 2002. Locations of observed (dark circles) and reported (light circles) sets are indicated.

Figure 3. Marine mammal takes during pelagic longline fishing effort during (A) 2001 and (B) 2002. Observed sets with no mammals takes are indicated by light circles.

Figure 4. Marine turtle takes during pelagic longline fishing effort during (A) 2001 and (B) 2002. Observed sets with no turtle takes are indicated by light circles.

Table 1. Total amount of fishing effort reported to the pelagic longline logbook program during 2001-2002 by year, quarter, and fishing area (Figure 1). Fishing effort is reported as A) Number of Hooks and B) Number of sets. NED-E indicates the NED experimental fishery.

A. Number of Hooks (x1000)

Year	Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	NED-E	SAB	SAR	TUN	TUS	Total
2001	1	160.2	283.9	528.4	59.0	39.3	2.3	1.9	0	139.2	7.8	15.2	26.9	1263.6
2001	2	0.5	150.0	862.8	200.0	58.7	93.6	53.4	0	373.5	0.8	26.9	48.8	1865.5
2001	3	1.6	127.6	895.7	352.6	2.4	434.9	34.7	48.7	170.1	0	1.6	32.8	2098.9
2001	4	56.6	63.9	653.5	462.0	2.6	87.9	0	69.5	114.5	0	0	34.0	1534.7
Total by Region		218.8	625.4	2940.3	1073.6	103.1	618.6	90.0	118.2	797.3	8.6	43.7	142.5	6762.7
2002	1	97.2	291.8	517.1	101.5	58.4	15.6	11.5	0	84.9	32.1	34.0	20.1	1269.1
2002	2	28.7	218.2	893.4	179.2	32.9	106.6	0.9	0	256.5	19.2	5.4	17.8	1758.6
2002	3	0	73.9	827.3	311.9	20.5	260.9	0	202.3	92.1	0	0	0	1779.5
2002	4	34.7	37.3	692.3	215.5	4.7	29.3	0	89.2	72.5	44.5	0	0	1216.4
Total by Region		160.7	621.2	2930.1	808.1	116.6	412.5	16.9	291.54	506.0	95.9	39.4	37.9	6023.6

B. Number of Sets

Year	Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	NED-E	SAB	SAR	TUN	TUS	Total
2001	1	240	487	849	90	51	3	2	0	229	11	18	57	2037
2001	2	1	243	1476	313	83	162	92	0	611	1	44	73	3099
2001	3	8	185	1423	534	3	697	53	79	263	0	3	53	3302
2001	4	86	91	984	687	4	148	0	105	175	0	0	45	2320
Total by Region		335	1006	4732	1624	141	1010	327	180	1278	12	65	228	10758
2002	1	142	428	744	154	88	23	20	0	121	44	65	34	1863
2002	2	38	311	1323	285	58	145	1	0	386	24	11	28	2610
2002	3	0	134	1452	532	34	454	0	338	173	0	0	0	3114
2002	4	70	58	1157	376	10	49	0	144	110	53	0	0	2027
Total by Region		250	931	4676	1347	190	671	21	482	790	121	76	62	9614

Table 2. Pelagic longline fishing effort observed during 2001-2002 by year, quarter, and fishing area (Figure 1). Fishing effort is reported as A) Number of Hooks and B) Number of sets. NED-E indicates the NED experimental fishery.

A. Number of Hooks (x1000)

Year	Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	NED-E	SAB	SAR	TUN	TUS	Total
2001	1	9.0	2.3	31.4	2.6	0	0	0	-	9.2	0	0	0	54.6
2001	2	0	3.9	52.2	17.1	12.1	8.8	0	-	16.1	0	0	0	110.2
2001	3	0	2.2	42.5	7.6	0.0	5.7	0	71.9	6.9	0	0	0	64.8
2001	4	0	1.3	26.9	22.4	0.0	5.8	-	92.7	4.3	0	0	0	60.7
Total By Region		9.0	9.7	153.0	49.7	12.1	20.3	0	164.6	36.5	0	0	0	290.3
2002	1	5.8	34.2	27.8	4.8	8.0	0	0	-	0	0	0	0	80.6
2002	2	2.4	8.9	34.7	9.8	0	6.3	0	-	14.3	0.8	0	0	77.1
2002	3	0	4.9	33.7	10.8	0	0.0	-	301.9	0	0	0	0	351.2
2002	4	8.3	0.0	22.9	21.6	0	4.2	-	139.9	0.9	0	0	0	197.8
Total By Region		16.5	48.0	119.0	46.9	8.0	10.5	0	441.9	15.2	0.8	0	0	706.7

B. Number of Sets

Year	Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	NED-E	SAB	SAR	TUN	TUS	Total
2001	1	10	7	47	4	0	0	0	-	13	0	0	0	83
2001	2	0	7	66	21	15	10	0	-	25	0	0	0	145
2001	3	0	5	56	9	0	6	0	80	20	0	0	0	98
2001	4	0	2	29	28	0	7	-	106	11	0	0	0	77
Total By Region		10	21	198	62	15	23	0	186	69	0	0	0	403
2002	1	8	40	33	5	12	0	0	-	0	0	0	0	98
2002	2	3	10	40	16	0	11	0	-	15	1	0	0	96
2002	3	0	14	46	11	0	0	-	343	0	0	0	0	417
2002	4	10	0	36	27	0	5	-	160	2	0	0	0	245
Total By Region		21	64	155	59	12	16	0	503	17	1	0	0	856

Table 3. Percentage of reported fishing effort observed during 2001-2002 by year, quarter, and fishing area (Figure 1) by A) Number of Hooks and B) Number of sets. Note that during the third and fourth quarters of both years in the NED experimental fishery (NED-E), the level of observed coverage in the NED fishing area exceeded the level of reported effort. The observer coverage during these periods was 100% of total actual fishing effort associated with an experiment to investigate factors effecting the rate of fishery interactions with sea turtles. Dashes indicate no reported fishing effort. Cells in which >10 longline sets were reported with no observer coverage are indicated in bold.

A. Percentage of Hooks

Year	Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	NED-E	SAB	SAR	TUN	TUS
2001	1	5.6	0.8	5.9	4.4	**0.0**	0.0	0.0	-	6.6	**0.0**	**0.0**	**0.0**
2001	2	0.0	2.6	6.0	8.5	20.5	9.4	**0.0**	-	4.3	**0.0**	**0.0**	**0.0**
2001	3	0.0	1.7	4.7	2.1	0.0	1.3	**0.0**	147.6	4.1	-	**0.0**	**0.0**
2001	4	**0.0**	2.0	4.1	4.9	0.0	6.6	**-**	133.8	3.8	-	-	**0.0**
2002	1	6.0	11.7	5.4	4.7	13.7	**0.0**	**0.0**	-	**0.0**	**0.0**	**0.0**	**0.0**
2002	2	8.3	4.1	3.2	5.4	**0.0**	5.9	0.0	-	5.6	4.1	**0.0**	**0.0**
2002	3	-	6.6	4.1	3.4	**0.0**	**0.0**	**-**	149.2	**0.0**	-	-	-
2002	4	23.9	**0.0**	3.3	10.0	0.0	14.3	**-**	156.8	1.2	**0.0**	-	-

B. Percentage of Sets

Year	Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED	NED-E	SAB	SAR	TUN	TUS
2001	1	4.2	1.4	5.5	4.4	**0.0**	0.0	0.0	-	5.7	**0.0**	**0.0**	**0.0**
2001	2	0.0	2.9	4.5	6.7	18.1	6.2	**0.0**	-	4.1	**0.0**	**0.0**	**0.0**
2001	3	0.0	2.7	3.9	1.7	0.0	0.9	**0.0**	101.2	7.6	-	**0.0**	**0.0**
2001	4	**0.0**	2.2	2.9	4.1	0.0	4.7	**-**	100.9	6.3	-	-	**0.0**
2002	1	5.6	9.3	4.4	3.2	13.6	**0.0**	**0.0**	-	**0.0**	**0.0**	**0.0**	**0.0**
2002	2	7.9	3.2	3.0	5.6	**0.0**	7.6	0.0	-	3.9	4.2	**0.0**	**0.0**
2002	3	-	10.4	3.2	2.1	**0.0**	**0.0**	**-**	101.5	**0.0**	-	-	-
2002	4	14.3	**0.0**	3.1	7.2	0.0	10.2	**-**	111.1	1.8	**0.0**	-	-

Table 4. Total number of observed interactions with A) marine mammals and B) marine turtles in the pelagic longline fishery during 2001-2002 by year, quarter, and fishing area. Dashes indicate areas where there was no observed fishing effort.

A. Marine Mammals

Year	Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED-E	SAB	Total
2001	1	0	0	0	0	-	-	-	0	0
2001	2	-	0	0	5	0	0	-	0	5
2001	3	-	0	0	0	-	0	3	1	4
2001	4	-	0	0	3	-	1	3	0	7
2001 Total		0	0	0	8	0	1	6	1	16
2002	1	0	0	0	0	0	-	-	-	0
2002	2	0	0	0	1	-	1	-	0	2
2002	3	-	0	0	0	-	-	7	-	7
2002	4	0	-	0	12	-	1	2	0	15
2002 Total		0	0	0	13	0	0	9	2	24

B. Marine Turtles

Year	Quarter	CAR	FEC	GOM	MAB	NCA	NEC	NED-E	SAB	Total
2001	1	3	2	0	1	-	-	-	7	13
2001	2	-	0	10	3	2	2	-	3	20
2001	3	-	1	8	1	-	1	83	2	96
2001	4	-	0	2	3	-	1	136	2	144
2001 Total		3	3	20	8	2	4	219	14	273
2002	1	2	14	4	2	0	-	-	-	22
2002	2	0	2	15	2	-	6	-	2	27
2002	3	-	0	11	0	-	-	166	-	177
2002	4	2	-	7	8	-	0	92	0	109
2002 Total		4	16	37	12	0	6	258	2	335

Table 5. Summary of release condition and serious injury types for marine mammals in the pelagic longline fishery during 2001-2002. Serious injury determinations were based upon written observer comments. "Entangled" indicates that the animal was released with > 6 feet of gear remaining attached.

Year	Species	Alive	Dead	Serious Injury			Total
				Mouth Hooked	Entangled	Mouth Hooked & Entangled	
2001	Risso's Dolphin	1	1	3	2	1	8
2001	Pilot Whale	1	1	0	2	2	6
2001	Striped Dolphin	1	0	0	0	0	1
2001	Northern Bottlenose Whale	0	0	0	1	0	1
2001 total		3	2	3	5	3	16
2002	Risso's Dolphin	6	0	1	2	1	10
2002	Pilot Whale	6	0	1	2	1	10
2002	Common Dolphin	1	0	0	0	0	1
2002	Un-id Dolphin	1	0	0	0	1	2
2002	Un-id Mammal	0	0	0	1	0	1
2002 total		14	0	2	5	3	24

Table 6. Summary of (A) release condition (B) and hook location in hooked animals, and (C) gear recovery in unhooked animals for marine turtles in the pelagic longline fishery during 2001-2002. Hook location information is recorded on the sea turtle life history form (Appendix A) by the observer.

A. Release condition

Year	Species	Alive, injured	Alive, uninjured	Fresh dead	Total
2001	Leatherback	102	15	0	122
2001	Loggerhead	150	0	1	151
2001	Un-identified	0	0	0	0
2001 total		257	15	1	273
2002	Leatherback	165	21	1	201
2002	Loggerhead	127	4	0	132
2002	Un-identified	1	0	0	2
2002 total		309	25	1	335

B. Hook Location

					Internal			External				
Year	Species	not hooked*	not known if hooked*	hooked, location unknown	unknown internal	swallowed	beak/mouth/ tongue/ glottis**	unknown external	beak/head /neck	carapace/ plastron	front flipper /shoulder/ armpit	rear flipper/groin/ tail
2001	Leatherback	17	3	4	0	1	6	2	7	8	73	1
2001	Loggerhead	2	0	0	0	85	61	0	0	0	3	0
2001	Un-id	0	0	0	0	0	0	0	0	0	0	0
2001 total		19*	3*	4	0	86	67	2	7	8	76	1
2002	Leatherback	23	10	6	0	2	8	4	5	5	136	0
2002	Loggerhead	4	1	0	1	72	50	0	0	1	3	0
2002	Un-id	0	0	1	1	0	0	0	0	0	0	0
2002 total		27*	11*	7	2	74	58	4	5	6	139	0

* Table 6c describes the amount of gear remaining on these animals when released.

** Table 6d decribes hook locations for internally hooked animals

Table 6 cont.

C. Gear recovery in unhooked animals

Year	Species	not hooked / all gear retrieved	not hooked/ gear not retrieved	Not known if hooked/ all gear retrieved	Not known if hooked/ gear not retrieved
2001	Leatherback	12	5	0	3
2001	Loggerhead	2	0	0	0
2001	Un-id	0	0	0	0
2001 total		14	5	0	3
2002	Leatherback	17	6	5	6
2002	Loggerhead	4	0	1	0
2002	Un-id	0	0	0	1
2002 total		21	6	6	7

D. Hook locations for animals hooked internally in the mouth and beak

Year	Species	Exact Location Unknown	Glottis	Mouth Internal	Beak Internal	Tongue
2001	Leatherback	6	0	0	0	0
2001	Loggerhead	19	0	25	9	8
2001	Un-id	0	0	0	0	0
2001 total		25	0	25	9	8
2002	Leatherback	0	0	5	3	0
2002	Loggerhead	6	1	15	17	11
2002	Un-id	0	0	0	0	0
2002 total		6	1	20	20	11

Table 7. Estimated (A) mortality, (B) serious injury, (C) live releases, and (D) total interactions for marine mammals in the pelagic longline fishery during 2001-2002 stratified by year, quarter, and fishing area. Since observed coverage in the NED area during the 3rd and 4th quarters of both years was equal to the total fishing effort, the observed interactions represents the total of all interactions for the experimental fishery.

A. Mortality

Species	Year	Quarter	Fishing Area	# Positive Sets	# Observed Sets	# Hooks Reported (x1000)	Mean CPUE	Var CPUE	Estimated N	CV N
PILOT WHALE	2001	2	MAB	1	21	200.0	0.0992	0.0098	19.8	1.000
RISSO'S DOLPHIN	2001	3	SAB	1	20	170.1	0.1437	0.0206	24.4	1.000

B. Serious Injury

Species	Year	Quarter	Fishing Area	# Positive Sets	# Observed Sets	# Hooks Reported (x1000)	Mean CPUE	Var CPUE	Estimated N	CV N
PILOT WHALE	2001	2	MAB	3	21	200	0.2510	0.0209	50.2	0.577
RISSO'S DOLPHIN	2001	4	MAB	2	28	462	0.0972	0.0046	44.9	0.695
RISSO'S DOLPHIN	2001	3	NED	3	80	71.9	-	-	3.0	-
NORTHERN BOTTLENOSE WHALE	2001	4	NED	1	106	92.7	-	-	1.0	-
RISSO'S DOLPHIN	2001	4	NED	1	106	92.7	-	-	1.0	-
PILOT WHALE	2002	2	MAB	1	16	179.2	0.0845	0.0071	15.1	1.000
PILOT WHALE	2002	4	MAB	3	27	215.5	0.1613	0.0081	34.8	0.558
RISSO'S DOLPHIN	2002	4	MAB	1	27	215.5	0.0370	0.0014	8.0	1.000
RISSO'S DOLPHIN	2002	3	NED	3	343	301.9	-	-	3.0	-
UN-ID DOLPHIN	2002	3	NED	1	343	301.9	-	-	1.0	-
UN-ID MARINE MAMMAL	2002	4	NED	1	160	139.9	-	-	1.0	-

Table 7 continued

C. Alive (Not Seriously Injured)

Species	Year	Quarter	Fishing Area	# Positive Sets	# Observed Sets	# Hooks Reported (x1000)	Mean CPUE	Var CPUE	Estimated N	CV N
PILOT WHALE	2001	4	MAB	1	28	462.0	0.0491	0.0024	22.7	1.000
PILOT WHALE	2002	4	MAB	1	27	215.5	0.3102	0.0962	66.8	1.000
STRIPED DOLPHIN	2001	4	NED	1	213	59.8	-	-	1.0	-
RISSO'S DOLPHIN	2001	4	NEC	1	7	87.9	0.1623	0.0264	14.3	1.000
RISSO'S DOLPHIN	2002	2	NEC	1	11	106.6	0.1894	0.0359	20.2	1.000
RISSO'S DOLPHIN	2002	3	NED	1	346	192.8	-	-	1.0	-
COMMON DOLPHIN	2002	3	NED	1	346	192.8	-	-	1.0	-
UN-ID DOLPHIN	2002	3	NED	1	346	192.8	-	-	1.0	-
PILOT WHALE	2002	4	NED	1	160	85.4	-	-	1.0	-
RISSO'S DOLPHIN	2002	4	MAB	2	27	215.5	0.1494	0.0108	32.2	0.694
RISSO'S DOLPHIN	2002	4	NEC	1	5	29.3	0.2119	0.0449	6.2	1.000

Table 7 continued
D. Total Interactions

Species	Year	Quarter	Fishing Area	# Positive Sets	# Observed Sets	# Hooks Reported (x1000)	Mean CPUE	Var CPUE	Estimated N	CV N
PILOT WHALE	2001	2	MAB	4	21	200	0.3508	0.0287	70.2	0.483
PILOT WHALE	2001	4	MAB	1	28	462	0.0491	0.0024	22.7	1.000
RISSO'S DOLPHIN	2001	4	MAB	2	28	462	0.0972	0.0046	44.9	0.695
RISSO'S DOLPHIN	2001	4	NEC	1	7	87.9	0.1623	0.0264	14.3	1.000
RISSO'S DOLPHIN	2001	3	NED	3	80	48.7	-	-	3.0	-
NORTHERN BOTTLENOSE WHALE	2001	4	NED	1	106	69.5	-	-	1.0	-
RISSO'S DOLPHIN	2001	4	NED	1	106	69.5	-	-	1.0	-
STRIPED DOLPHIN	2001	4	NED	1	106	69.5	-	-	1.0	-
RISSO'S DOLPHIN	2001	3	SAB	1	20	170.1	0.1437	0.0206	24.4	1.000
PILOT WHALE	2002	2	MAB	1	16	179.2	0.0845	0.0071	15.1	1.000
PILOT WHALE	2002	4	MAB	3	27	215.5	0.4379	0.1034	94.4	0.734
RISSO'S DOLPHIN	2002	4	MAB	3	27	215.5	0.1871	0.0121	40.3	0.587
RISSO'S DOLPHIN	2002	2	NEC	1	11	106.6	0.1894	0.0359	20.2	1.000
RISSO'S DOLPHIN	2002	4	NEC	1	5	29.3	0.2119	0.0449	6.2	1.000
COMMON DOLPHIN	2002	3	NED	1	343	202.3	-	-	1.0	-
RISSO'S DOLPHIN	2002	3	NED	4	343	202.3	-	-	4.0	-
UN-ID DOLPHIN	2002	3	NED	2	343	202.3	-	-	1.0	-
PILOT WHALE	2002	4	NED	1	160	89.2	-	-	1.0	-
UN-ID MARINE MAMMAL	2002	4	NED	1	160	89.2	-	-	1.0	-

Table 8. Estimated (A) mortalities, (B) live releases, and (C) total interactions for marine turtles in the pelagic longline fishery during 2001-2002 stratified by year, quarter, and fishing area. Since observed covereage in the NED area during the 3rd and 4th quarters of both years was equal to the total fishing effort, the observed interactions represents the total interactions for the experimental fishery.

A. Mortalities

Species	Year	Quarter	Fishing Area	# Positive Sets	# Observed Sets	# Hooks Reported (x1000)	Mean CPUE	Var CPUE	Estimated N	CV N
Leatherback	2002	3	GOM	1	46	827.3	0.0395	0.0016	32.7	1.000
Loggerhead	2001	1	SAB	1	13	139.2	0.0916	0.0084	12.7	1.000

B. Released Alive

Species	Year	Quarter	Fishing Area	# Positive Sets	# Observed Sets	# Hooks Reported (x1000)	Mean CPUE	Var CPUE	Estimated N	CV N
Leatherback	2001	1	CAR	2	10	160.2	0.2111	0.0199	33.8	0.668
Leatherback	2001	1	FEC	2	7	283.9	0.8929	0.3322	253.5	0.645
Leatherback	2001	1	SAB	5	13	139.2	0.7098	0.0908	98.8	0.425
Leatherback	2001	2	GOM	10	66	862.8	0.2119	0.0042	182.8	0.306
Leatherback	2001	2	MAB	2	21	200.0	0.1268	0.0081	25.4	0.711
Leatherback	2001	2	NEC	1	10	93.6	0.1266	0.0160	11.8	1.000
Leatherback	2001	2	SAB	3	25	373.5	0.1315	0.0054	49.1	0.556
Leatherback	2001	3	FEC	1	5	127.6	0.4630	0.2143	59.1	1.000
Leatherback	2001	3	GOM	8	56	895.7	0.1815	0.0036	162.6	0.331
Leatherback	2001	3	MAB	1	9	352.6	0.1821	0.0332	64.2	1.000
Leatherback	2001	3	NED	33	80	71.9	-	-	38.0	-
Leatherback	2001	3	SAB	2	20	170.1	0.3356	0.0585	57.1	0.721
Leatherback	2001	4	GOM	2	29	653.5	0.0724	0.0025	47.3	0.694
Leatherback	2001	4	MAB	2	28	462.0	0.1067	0.0055	49.3	0.695
Leatherback	2001	4	NEC	1	7	87.9	0.2041	0.0416	17.9	1.000
Leatherback	2001	4	NED	35	106	92.7	-	-	39.0	-
Leatherback	2001	4	SAB	1	11	114.5	0.3157	0.0996	36.1	1.000
Leatherback	2002	1	FEC	6	40	291.8	0.2399	0.0100	70.0	0.416
Leatherback	2002	1	GOM	4	33	517.1	0.1439	0.0048	74.4	0.483
Leatherback	2002	2	FEC	1	10	218.2	0.1263	0.0159	27.6	1.000
Leatherback	2002	2	GOM	9	40	893.4	0.2581	0.0059	230.6	0.298
Leatherback	2002	2	MAB	1	16	179.2	0.2273	0.0517	40.7	1.000

Table 8 cont.
B. Released Alive (cont.)

Species	Year	Quarter	Fishing Area	# Positive Sets	# Observed Sets	# Hooks Reported (x1000)	Mean CPUE	Var CPUE	Estimated N	CV N
Leatherback	2002	2	SAB	2	15	256.5	0.1300	0.0081	33.3	0.692
Leatherback	2002	3	GOM	7	46	827.3	0.2660	0.0119	220.6	0.410
Leatherback	2002	3	NED	91	343	301.9	-	-	122.0	-
Leatherback	2002	4	GOM	4	36	692.3	0.1967	0.0098	136.2	0.503
Leatherback	2002	4	MAB	3	27	215.5	0.1347	0.0057	29.0	0.563
Leatherback	2002	4	NED	34	160	139.9	-	-	36.0	-
Loggerhead	2001	1	CAR	1	10	160.2	0.1000	0.0100	16.0	1.000
Loggerhead	2001	1	MAB	1	4	59.0	0.3255	0.1060	19.2	1.000
Loggerhead	2001	2	NCA	2	15	58.7	0.1580	0.0116	9.3	0.682
Loggerhead	2001	2	NEC	1	10	93.6	0.1198	0.0143	11.2	1.000
Loggerhead	2001	3	NEC	1	6	434.9	0.2433	0.0592	105.8	1.000
Loggerhead	2001	3	NED	30	80	71.9	-	-	45.0	-
Loggerhead	2001	4	MAB	1	28	462.0	0.0510	0.0026	23.6	1.000
Loggerhead	2001	4	NED	40	106	92.7	-	-	97.0	-
Loggerhead	2001	4	SAB	1	11	114.5	0.2296	0.0527	26.3	1.000
Loggerhead	2002	1	CAR	2	8	97.2	0.3526	0.0534	34.3	0.655
Loggerhead	2002	1	FEC	6	40	291.8	0.2251	0.0090	65.7	0.421
Loggerhead	2002	1	MAB	2	5	101.5	0.4318	0.0728	43.8	0.625
Loggerhead	2002	2	FEC	1	10	218.2	0.1081	0.0117	23.6	1.000
Loggerhead	2002	2	GOM	5	40	893.4	0.1463	0.0038	130.7	0.424
Loggerhead	2002	2	NEC	5	11	106.6	0.9781	0.1527	104.3	0.399
Loggerhead	2002	3	GOM	1	46	827.3	0.0229	0.0005	18.9	1.000
Loggerhead	2002	3	NED	33	343	301.9	-	-	44.0	-
Loggerhead	2002	4	CAR	1	10	34.7	0.2451	0.0601	8.5	1.000
Loggerhead	2002	4	GOM	1	36	692.3	0.0929	0.0009	20.2	1.000
Loggerhead	2002	4	MAB	5	27	215.5	0.2346	0.0095	50.5	0.416
Loggerhead	2002	4	NED	28	160	139.9	-	-	56.0	-
Un-identified	2002	2	GOM	1	40	893.4	0.0298	0.0009	26.6	1.000
Un-identified	2002	4	GOM	1	36	692.3	0.0335	0.0011	23.2	1.000

Table 8 cont.
C. Total interactions

Species	Year	Quarter	Fishing Area	# Positive Sets	# Observed Sets	# Hooks Reported (x1000)	Mean CPUE	Var CPUE	Estimated N	CV N
Leatherback	2001	1	CAR	2.0	10	160.2	0.2111	0.0199	33.8	0.668
Leatherback	2001	1	FEC	2.0	7	283.9	0.8929	0.3322	253.5	0.645
Leatherback	2001	1	SAB	5.0	13	139.2	0.7098	0.0908	98.8	0.425
Leatherback	2001	2	GOM	10.0	66	862.8	0.2119	0.0042	182.8	0.306
Leatherback	2001	2	MAB	2.0	21	200.0	0.1268	0.0081	25.4	0.711
Leatherback	2001	2	NEC	1.0	10	93.6	0.1266	0.0160	11.8	1.000
Leatherback	2001	2	SAB	3.0	25	373.5	0.1315	0.0054	49.1	0.556
Leatherback	2001	3	FEC	1.0	5	127.6	0.4630	0.2143	59.1	1.000
Leatherback	2001	3	GOM	8.0	56	895.7	0.1815	0.0036	162.6	0.331
Leatherback	2001	3	MAB	1.0	9	352.6	0.1821	0.0332	64.2	1.000
Leatherback	2001	3	NED	33.0	80	71.9	-	-	38.0	-
Leatherback	2001	3	SAB	2.0	20	170.1	0.3356	0.0585	57.1	0.721
Leatherback	2001	4	GOM	2.0	29	653.5	0.0724	0.0025	47.3	0.694
Leatherback	2001	4	MAB	2.0	28	462.0	0.1067	0.0055	49.3	0.695
Leatherback	2001	4	NEC	1.0	7	87.9	0.2041	0.0416	17.9	1.000
Leatherback	2001	4	NED	35.0	106	92.7	-	-	39.0	-
Leatherback	2001	4	SAB	1.0	11	114.5	0.3157	0.0996	36.1	1.000
Leatherback	2002	1	FEC	6.0	40	291.8	0.2399	0.0100	70.0	0.416
Leatherback	2002	1	GOM	4.0	33	517.1	0.1439	0.0048	74.4	0.483
Leatherback	2002	2	FEC	1.0	10	218.2	0.1263	0.0159	27.6	1.000
Leatherback	2002	2	GOM	9.0	40	893.4	0.2581	0.0059	230.6	0.298
Leatherback	2002	2	MAB	1.0	16	179.2	0.2273	0.0517	40.7	1.000
Leatherback	2002	2	SAB	2.0	15	256.5	0.1300	0.0081	33.3	0.692
Leatherback	2002	3	GOM	8.0	46	827.3	0.3062	0.0131	253.3	0.374
Leatherback	2002	3	NED	91.0	343	301.9	-	-	122.0	-
Leatherback	2002	4	GOM	4	36	692.3	0.1967	0.0098	136.2	0.503
Leatherback	2002	4	MAB	3.0	27	215.5	0.1347	0.0057	29.0	0.563
Leatherback	2002	4	NED	34.0	160	139.9	-	-	36.0	-

Table 8 cont.

C. Total interactions (cont.)

Species	Year	Quarter	Fishing Area	# Positive Sets	# Observed Sets	# Hooks Reported (x1000)	Mean CPUE	Var CPUE	Estimated N	CV N
Loggerhead	2001	1	CAR	1.0	10	160.2	0.1000	0.0100	16.0	1.000
Loggerhead	2001	1	MAB	1.0	4	59.0	0.3255	0.1060	19.2	1.000
Loggerhead	2001	1	SAB	1.0	13	139.2	0.0916	0.0084	12.7	1.000
Loggerhead	2001	2	NCA	2.0	15	58.7	0.1580	0.0116	9.3	0.682
Loggerhead	2001	2	NEC	1.0	10	93.6	0.1198	0.0143	11.2	1.000
Loggerhead	2001	3	NEC	1.0	6	434.9	0.2433	0.0592	105.8	1.000
Loggerhead	2001	3	NED	30.0	80	71.9	-	-	45.0	-
Loggerhead	2001	4	MAB	1.0	28	462.0	0.0510	0.0026	23.6	1.000
Loggerhead	2001	4	NED	40.0	106	92.7	-	-	97.0	-
Loggerhead	2001	4	SAB	1.0	11	114.5	0.2296	0.0527	26.3	1.000
Loggerhead	2002	1	CAR	2.0	8	97.2	0.3526	0.0534	34.3	0.655
Loggerhead	2002	1	FEC	6.0	40	291.8	0.2251	0.0090	65.7	0.421
Loggerhead	2002	1	MAB	2.0	5	101.5	0.4318	0.0728	43.8	0.625
Loggerhead	2002	2	FEC	1.0	10	218.2	0.1081	0.0117	23.6	1.000
Loggerhead	2002	2	GOM	5.0	40	893.4	0.1463	0.0038	130.7	0.424
Loggerhead	2002	2	NEC	5.0	11	106.6	0.9781	0.1527	104.3	0.399
Loggerhead	2002	3	GOM	1.0	46	827.3	0.0229	0.0005	18.9	1.000
Loggerhead	2002	3	NED	33.0	343	301.9	-	-	44.0	-
Loggerhead	2002	4	CAR	1.0	10	34.7	0.2451	0.0601	8.5	1.000
Loggerhead	2002	4	GOM	1.0	36	692.3	0.0929	0.0009	20.2	1.000
Loggerhead	2002	4	MAB	5.0	27	215.5	0.2346	0.0095	50.5	0.416
Loggerhead	2002	4	NED	28.0	160	139.9	-	-	56.0	-
Un-identified	2002	2	GOM	1.0	40	893.4	0.0298	0.0009	26.6	1.000
Un-identified	2002	4	GOM	1.0	36	692.3	0.0335	0.0011	23.2	1.000

Table 9. Estimated interactions in the pelagic longline fishery for strata with reported effort but no observer coverage during 2001 and 2002. Bycatch rates are the average of the stratum rates during the previous five years when observer coverage occurred. No live releases (not seriously injured) of marine mammals were observed in these strata during the previous 5 years. Estimates are presented only for strata with observed bycatch of each species.

Species	Year of Estimate	Area	Quarter	# of Observed Years	Years with Bycatch	Type	Average Rate	Reported Effort	Estimated Bycatch	CV Bycatch
Risso's Dolphin	2002	SAB	3	4	2	Mortality	0.2219	92.1	20.4	0.854
Pilot Whale	2002	FEC	4	5	1	Mortality	0.0554	37.3	2.1	1.000
Pilot Whale	2002	NEC	3	5	1	Serious Injury	0.0075	260.9	1.9	1.000
Leatherback	2001	CAR	4	2	1	Alive	0.7716	34.7	26.8	1.000
Leatherback	2001	NCA	1	5	1	Alive	0.0168	39.3	0.7	1.000
Leatherback	2001	NED	2	2	1	Alive	0.1198	53.4	6.4	0.503
Leatherback	2001	NED	3	3	3	Alive	0.7407	34.7	25.7	0.279
Leatherback	2002	FEC	4	5	1	Alive	0.0554	37.3	2.1	1.000
Leatherback	2002	NEC	3	5	2	Alive	0.0207	260.9	5.4	0.761
Leatherback	2002	SAB	1	5	2	Alive	0.2536	84.9	21.5	0.383
Leatherback	2002	SAB	3	4	3	Alive	0.4128	92.1	38.0	0.587
Loggerhead	2001	CAR	4	2	1	Alive	0.3282	34.7	11.4	0.668
Loggerhead	2001	NCA	1	5	3	Alive	0.1003	39.3	3.9	0.409
Loggerhead	2001	NED	2	2	2	Alive	0.8836	53.4	47.2	0.541
Loggerhead	2001	NED	3	3	3	Alive	0.7258	34.7	25.2	0.208
Loggerhead	2002	FEC	4	5	3	Alive	0.2679	37.3	10.0	0.671
Loggerhead	2002	NEC	3	5	5	Alive	0.1625	260.9	42.4	0.338
Loggerhead	2002	SAB	1	5	2	Alive	0.0357	84.9	3.0	0.738
Loggerhead	2002	SAB	3	4	1	Alive	0.1860	92.1	17.1	1.000
Loggerhead	2002	SAB	1	5	1	Mortality	0.0183	84.9	1.6	1.000

Table 10. Total mortalities and serious injuries of marine mammals in pelagic longline sets. Mortality from pelagic longline fishery (A) is estimated by summing across individual strata estimates and estimates from unobserved strata. Serious injury, mortality, and live releases from the NED experimental fishery (B) reflect total bycatch during 100% observer coverage.

A. Pelagic longline fishery effort.

	Mortality	CV Mortality	Serious Injury	CV Serious Injury	Alive	CV Alive	Total	CV Total	95% CI
2001									
Pilot Whale	19.8	1.000	50.2	0.577	22.7	1.000	92.9	0.439	41.7 - 206.8
Risso's Dolphin	24.4	1.000	44.9	0.695	14.3	1.000	83.6	0.504	33.8 - 207.0
2002									
Pilot Whale	2.1	1.000	51.8	0.477	66.8	1.000	113.5*	0.625	38.0 - 339.1
Risso's Dolphin	20.4	0.856	8.0	1.000	58.6	0.525	87.2	0.415	40.8 - 186.4

* Note that the estimate of total interactions is not necessarily the sum of total mortality, serious injury, and live releases due to the logarithm in the delta estimator.

B. NED Experimental Fishery

Species	Serious Injury	Mortality	Alive
2001			
Risso's Dolphin	4	0	0
Northern Bottlenose Whale	1	0	0
Striped Dolphin	0	0	1
2002			
Risso's Dolphin	3	0	1
Common Dolphin	0	0	1
Pilot Whale	0	0	1
Un-id Dolphin	1	0	1
Un-id Marine Mammal	1	0	0

Table 11. Estimated interactions with marine turtles in pelagic longline sets for (A) Leatherback turtle and (B) Loggerhead turtles summarized by year and geographic area. * indicates regions with reported effort where no estimate is possible during at least one quarter.

A. Leatherback Turtles

Area	Dead	Dead CV	Alive	Alive CV	Total	Total CV	95% Confidence Interval
CAR	0.0	-	60.6	0.578	60.6	0.578	21.8 - 168.6
FEC	0.0	-	312.6	0.557	312.6	0.557	116.1 - 841.3
GOM	0.0	-	392.7	0.215	392.7	0.215	262.1 – 588.5
MAB	0.0	-	138.9	0.540	138.9	0.540	53.0 - 364.1
NCA	0.0	-	0.7	1.000	0.7	1.000	0.1 - 3.2
NEC	0.0	-	29.8	0.722	29.8	0.722	8.7 - 102.3
NED*	0.0	-	32.1	0.245	32.1	0.245	20.3 - 50.9
SAB	0.0	-	241.1	0.308	241.1	0.308	135.9 - 427.8
2001 Total	**0.0**	**-**	**1208.4**	**0.185**	**1208.4**	**0.185**	**851.1 – 1715.8**
CAR	0.0	-	0.0	-	0.0	-	-
FEC	0.0	-	99.6	0.403	99.6	0.403	47.6 - 208.7
GOM	32.7	1.000	661.8	0.208	694.6	0.202	474.4 – 1017.0
MAB	0.0	-	69.8	0.629	69.8	0.629	23.2 - 209.7
NCA*	0.0	-	0.0	-	0.0	-	-
NEC*	0.0	-	5.4	0.761	5.4	0.761	1.5 - 19.6
NED	0.0	-	0.0	-	0.0	-	-
SAB	0.0	-	92.9	0.357	92.9	0.357	48.0 - 179.7
2002 Total	**32.7**	**1.000**	**929.5**	**0.165**	**962.3**	**0.162**	**707.8 – 1308.2**

B. Loggerhead Turtles

Area	Dead	Dead CV	Alive	Alive CV	Total	Total CV	95% Confidence Interval
CAR	0.0	-	27.4	0.647	27.4	0.647	8.9 - 84.6
FEC	0.0	-	0.0	-	0.0	-	-
GOM	0.0	-	0.0	-	0.0	-	-
MAB	0.0	-	42.8	0.711	42.8	0.711	12.6 - 144.7
NCA	0.0	-	13.2	0.494	13.2	0.494	5.4 - 32.2
NEC	0.0	-	117.0	0.909	117.0	0.909	26.7 - 513.8
NED	0.0	-	72.4	0.360	72.4	0.360	37.2 - 140.8
SAB	12.7	1.000	26.3	1.000	39.0	0.748	10.9 - 139.2
2001 Total	**12.7**	**1.000**	**299.1**	**0.395**	**311.8**	**0.381**	**154.5 - 629.3**
CAR	0.0		42.8	0.561	42.8	0.561	15.8 - 116.0
FEC	0.0		99.3	0.372	99.3	0.372	50.0 - 197.3
GOM	0.0		169.8	0.365	169.8	0.365	86.6 - 333.0
MAB	0.0		94.4	0.366	94.4	0.366	48.0 - 185.5
NCA*	0.0	-	0.0	-	0.0	-	-
NEC*	0.0		146.7	0.300	146.7	0.300	83.8 - 256.8
NED*	0.0	-	0.0	-	0.0	-	-
SAB	1.6	1.000	20.2	0.857	21.7	0.799	5.7 - 82.9
2002 Total	**1.6**	**1.000**	**573.1**	**0.167**	**574.6**	**0.167**	**418.9 – 788.3**

Table 12. Total interactions with marine turtles during the 2001 and 2002 NED experimental fishery. All turtles captured during experimental sets were released alive.

Species	Total Interactions
2001	
Leatherback Turtle	77
Loggerhead Turtle	142
2002	
Leatherback Turtle	158
Loggerhead Turtle	100

Figure 1. Pelagic longline fishing areas in the north Atlantic ocean indicating 11 defined fishing areas. CAR = Caribbean, GOM = Gulf of Mexico, FEC = Florida East Coast, SAB = South Atlantic Bight, SAR = Sargasso Sea, MAB = Mid-Atlantic bight, NEC = Northeast Coastal, NED = Northeast Distant, NCA = North Central Atlantic, TUN = Tuna North, TUS = Tuna South. Pelagic longline closed areas are indicated by shaded polygons and letter labels (A-E).

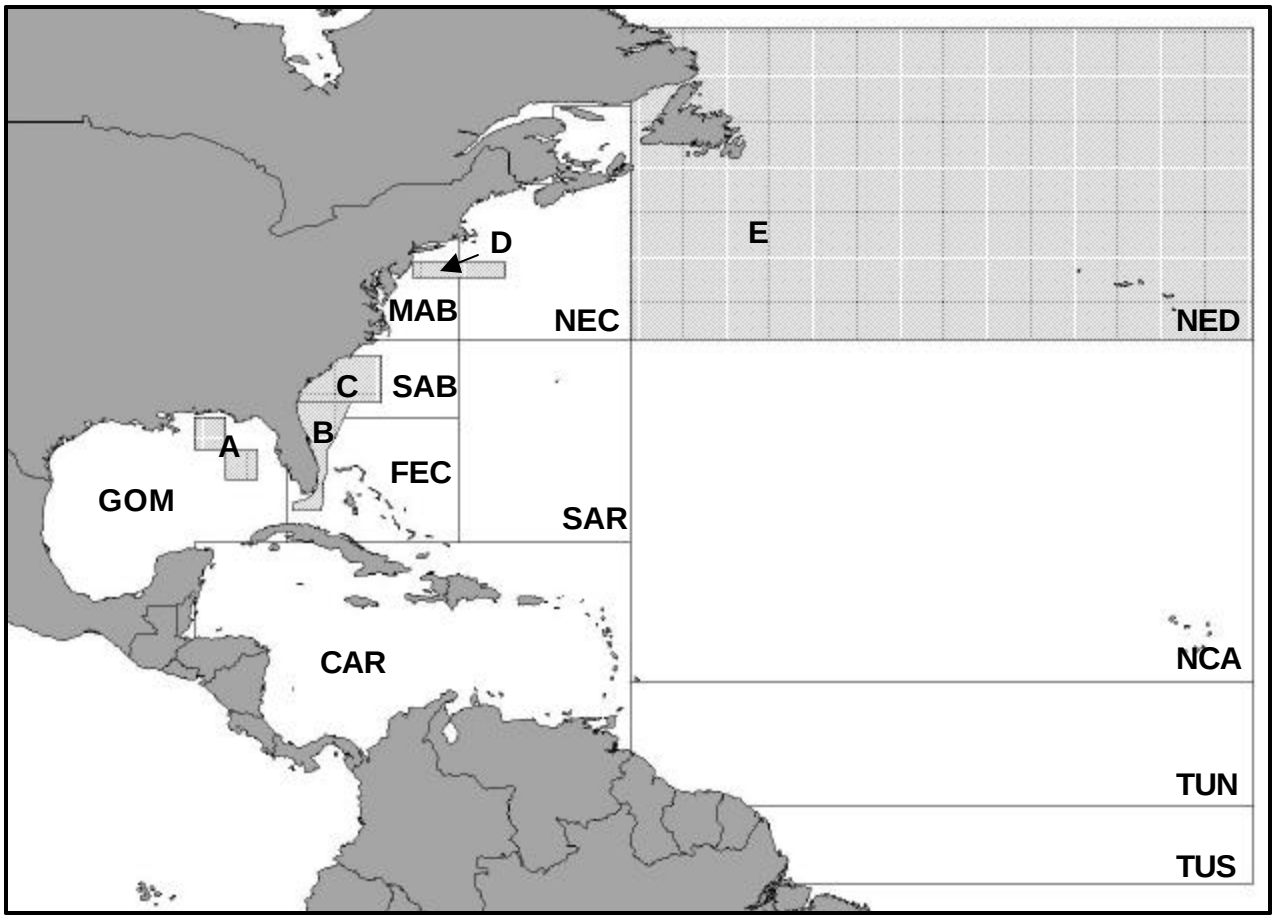


Figure 2. Pelagic longline fishing effort during (A) 2001 and (B) 2002. Locations of observed (dark circles) and reported (light circles) sets are indicated.

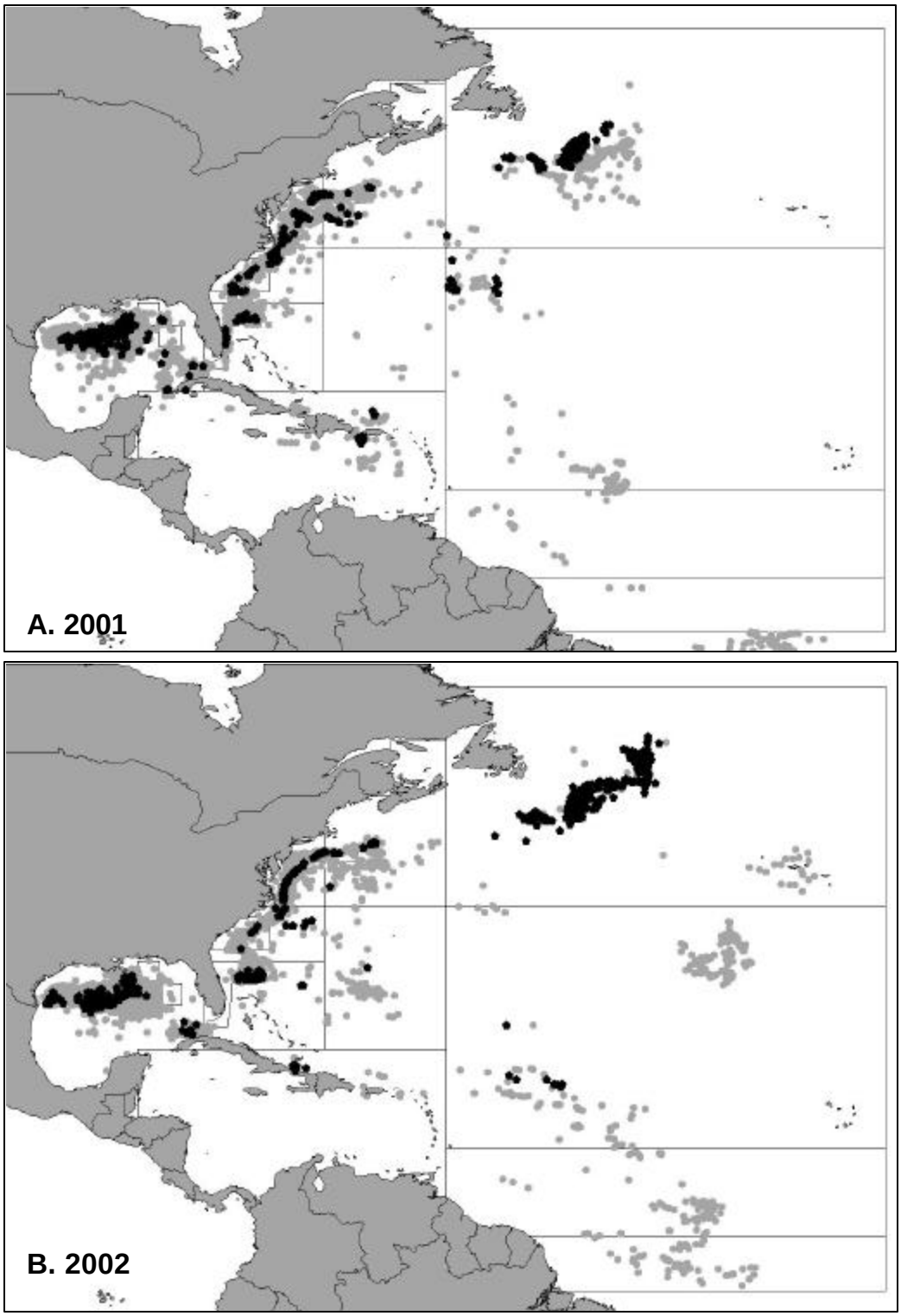


Figure 3. Marine mammal takes during pelagic longline fishing effort during (A) 2001 and (B) 2002. Observed sets with no mammals takes are indicated by light circles.

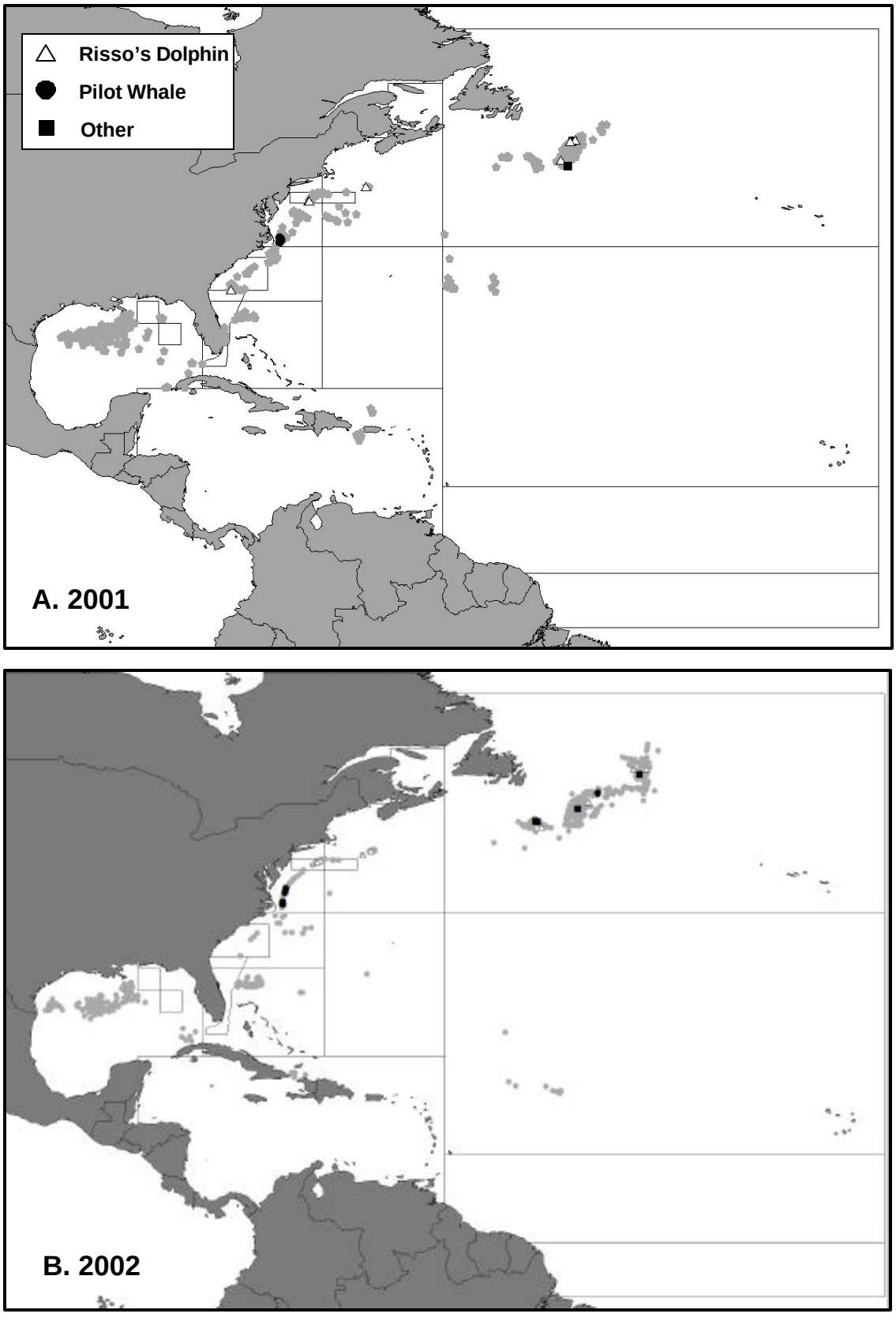
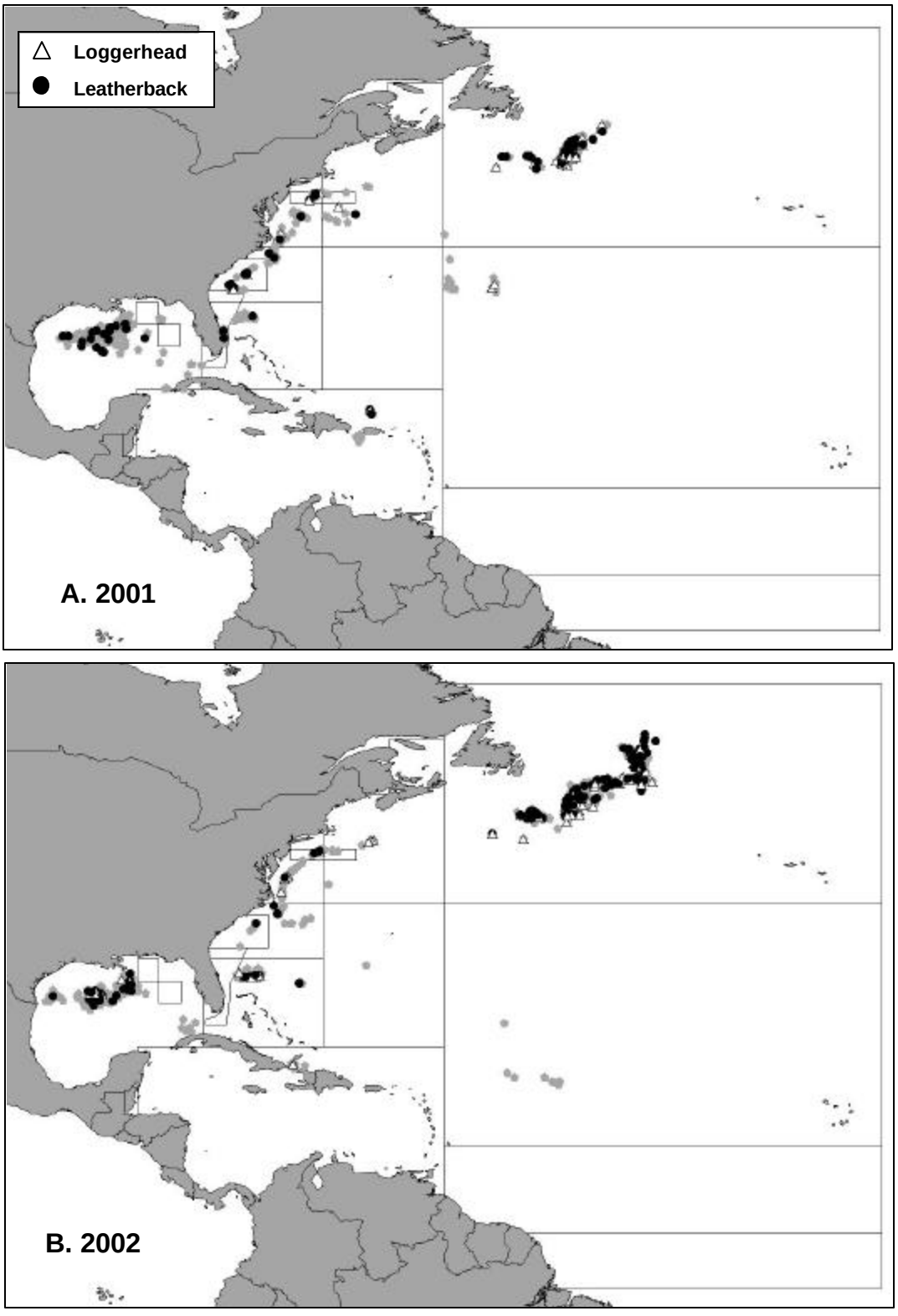


Figure 4. Marine turtle takes during pelagic longline fishing effort during (A) 2001 and (B) 2002. Observed sets with no turtle takes are indicated by light circles.



Appendix A. Sea Turtle Life History Form – page 1

SEA TURTLE LIFE HISTORY FORM

05/03

CAPTURE INFORMATION

TRIP ☐☐☐☐☐☐ YEAR 20☐☐ MONTH☐☐ DAY☐☐

SET/HAUL/TOW ☐☐☐ SPECIMEN NUMBER BY TRIP ☐☐☐

GEAR TYPE: ☐Longline ☐Gill Net ☐Trawl
GEAR DEPTH: ☐Surface ☐Midwater ☐Bottom

TIME (24 hr) ☐☐☐☐ WATER TEMP (°F) ☐☐.☐

LATITUDE ☐☐deg☐☐.☐min N / S LONGITUDE ☐☐☐deg☐☐.☐min E / W

Did turtle slide out/escape from gear? Y / N Was turtle brought on board? Y / N

Was light stick on hook? Y / N / U Color? White, Pink, Blue, Green, Black, Red, Yellow, Purple, Other, Unknown

If No, number of gangions to next light stick ☐☐
Color? White, Pink, Blue, Green, Black, Red, Yellow, Purple, Other, Unknown

Number of gangions to next float ☐☐

IDENTIFICATION (see back) Number of Photos Taken? ☐☐

SPECIES: Leatherback ☐ Loggerhead ☐ Kemp's ridley ☐ Green ☐ Hawksbill ☐ Olive ridley ☐
Unidentified Hardshell ☐ Unknown ☐

CONDITION OF TURTLE

☐Previously dead ☐Fresh dead ☐Comatose (resuscitated) ☐Other (describe)
☐Alive, injured (describe) ☐Alive, uninjured ☐Alive, unknown ☐Unknown (describe)

HOOK LOCATION

(circle specific location; check box if specifics are not known; annotate drawing on reverse to indicate location as needed):

☐ Not Hooked ☐ Not Known if Hooked ☐Hooked, but location totally Unknown

Internal: ☐Unknown, internal ☐Ingested (Esophagus)
☐Beak/Mouth/Tongue/Glottis – note location in jaw: ☐upper ☐lower ☐side ☐other (describe)

External: ☐Unknown, external ☐Beak/Head/Neck ☐Carapace/Plastron
☐Front Flipper/Shoulder/Armpit ☐Rear Flipper/Groin/Tail

Was hook removed from this animal? Y / N / Unknown / Not Applicable

Was animal entangled in gear? Y / N / Unknown

How much gear (linear feet) was left on turtle when released? ☐☐☐.☐ ft. (estimated/measured)

Estimated carapace length (notch-to-tip straight line): ☐☐.☐ ft (needed only if turtle is not boated & measured)

Appendix A. Sea Turtle Life History Form – page 2

BIOLOGICAL INFORMATION

DIMENSIONS (cm)

	Curved (measuring tape) Standard Measurements	Straight Line (calipers) Standard Measurements	Straight Line (calipers)
Carapace Length	☐☐☐.☐ notch-to-tip	☐☐☐.☐ notch-to-tip	☐☐☐.☐ notch-to-notch
Carapace Width	☐☐☐.☐	☐☐☐.☐	

TAGS (identify address on each tag in the comments section)

Flipper Tag Number	Metal (1) or Plastic (2)	Position (Flipper) LF, RF, LR, RR	Already Present (1) or Applied by Observer (2)	Were Tags Removed?
☐☐☐☐☐☐	☐	☐☐	☐	Y / N
☐☐☐☐☐☐	☐	☐☐	☐	Y / N
☐☐☐☐☐☐	☐	☐☐	☐	Y / N
☐☐☐☐☐☐	☐	☐☐	☐	Y / N

PIT Tag ☐☐☐☐☐☐☐☐☐☐ ☐☐ ☐ Scanned? Y / N

Living Tag (describe)_____ Other Tags (describe) _____

(Put PIT tag label here)

BIOPSY SAMPLES TAKEN? Y / N (itemize below) / Unsuccessful

RELEASE INFORMATION

LATITUDE ☐☐deg☐☐.☐min N / S LONGITUDE ☐☐☐deg☐☐.☐min E / W

TIME (24 hr) ☐☐☐☐ WATER TEMP (°F) ☐☐.☐

DATE, if different from capture: YEAR 20☐☐ MONTH☐☐ DAY☐☐

FINAL DISPOSITION

☐ Discarded Marked Carcass ☐ Discarded Unmarked Carcass ☐ Salvaged Carcass

☐ Released Alive ☐ Taken to Holding Facility ☐ Unknown (explain)

ADDITIONAL COMMENTS (list all biological samples collected; describe or sketch any anomalies):

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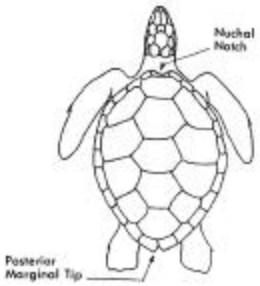

IDENTIFICATION CRITERIA

Number of:

Left Costal Scutes	☐	Overlapping Scutes?	Y / N / U	Does Nuchal Scute
Right Costal Scutes	☐	Inframarginal Pores?	Y / N / U	Touch 1st Lateral Scute?
Vertebral Scutes	☐	1 Pair Prefrontal Scales?	Y / N / U	Y / N / U
L. Inframarginal Scutes	☐	Lacks Bony Shell?	Y / N	
R. Inframarginal Scutes	☐			

Dorsal Coloration ☐ Black ☐ Orange/Red-Brown ☐ Brown

☐ Gray-Green ☐ Other_____

Appendix B: Tables of observed interactions for individual longline sets.

Table B1. Observed interactions per longline set with marine mammals ordered by year, species, quarter, and fishing area. The number of hooks in the longline set is reported along with the release status of the animal(s). Note that all observed sets in the NED area are part of the experimental fishery.

ID #	Year	Month	Quarter	Fishing Area	# Hooks	Species	Caught	Dead	Serious Injury
1	2001	4	2	MAB	480	PILOT WHALE	1	1	0
2	2001	6	2	MAB	990	PILOT WHALE	2	0	2
3	2001	6	2	MAB	924	PILOT WHALE	1	0	1
4	2001	6	2	MAB	465	PILOT WHALE	1	0	1
5	2001	9	3	NED	420	RISSO'S DOLPHIN	1	0	1
6	2001	9	3	NED	420	RISSO'S DOLPHIN	1	0	1
7	2001	9	3	NED	378	RISSO'S DOLPHIN	1	0	1
8	2001	9	3	SAB	348	RISSO'S DOLPHIN	1	1	0
9	2001	10	4	NED	495	NORTHERN BOTTLENOSE WHALE	1	0	1
10	2001	10	4	NED	432	RISSO'S DOLPHIN	1	0	1
11	2001	10	4	NED	420	STRIPED DOLPHIN	1	0	0
12	2001	11	4	MAB	727	PILOT WHALE	1	0	0
13	2001	11	4	MAB	690	RISSO'S DOLPHIN	1	0	1
14	2001	11	4	MAB	786	RISSO'S DOLPHIN	1	0	1
15	2001	11	4	NEC	880	RISSO'S DOLPHIN	1	0	0
16	2002	4	2	MAB	740	PILOT WHALE	1	0	1
17	2002	6	2	NEC	480	RISSO'S DOLPHIN	1	0	0
18	2002	8	3	NED	936	COMMON DOLPHIN	1	0	0
19	2002	8	3	NED	701	RISSO'S DOLPHIN	1	0	1
20	2002	8	3	NED	864	RISSO'S DOLPHIN	1	0	1
21	2002	9	3	NED	936	RISSO'S DOLPHIN	1	0	1
22	2002	9	3	NED	987	RISSO'S DOLPHIN	1	0	0
23	2002	9	3	NED	816	UN-ID DOLPHIN	1	0	0
24	2002	9	3	NED	924	UN-ID DOLPHIN	1	0	1
25	2002	10	4	MAB	746	PILOT WHALE	1	0	1
26	2002	10	4	NED	1125	PILOT WHALE	1	0	0
27	2002	10	4	MAB	948	RISSO'S DOLPHIN	2	0	0
28	2002	10	4	NEC	944	RISSO'S DOLPHIN	1	0	0
29	2002	11	4	MAB	746	PILOT WHALE	1	0	1
30	2002	11	4	MAB	597	PILOT WHALE	6	0	1
31	2002	11	4	MAB	520	RISSO'S DOLPHIN	1	0	0
32	2002	11	4	MAB	1000	RISSO'S DOLPHIN	1	0	1
33	2002	11	4	NED	800	UN-ID MARINE MAMMAL	1	0	1

Table B2. Observed interactions per longline set with marine turtles ordered by species, year, and quarter. The number of hooks in the longline set is reported along with the release status of the animal(s). Note that all observed sets in the NED area are part of the experimental fishery.

Id #	Year	Species	Quarter	Area	N Hooks	Dead	Alive
1	2001	Leatherback	1	SAB	840	0	1
2	2001	Leatherback	1	SAB	960	0	1
3	2001	Leatherback	1	SAB	840	0	1
4	2001	Leatherback	1	FEC	320	0	1
5	2001	Leatherback	1	FEC	320	0	1
6	2001	Leatherback	1	CAR	1000	0	1
7	2001	Leatherback	1	CAR	900	0	1
8	2001	Leatherback	1	SAB	600	0	2
9	2001	Leatherback	1	SAB	395	0	1
10	2001	Leatherback	2	SAB	852	0	1
11	2001	Leatherback	2	SAB	852	0	1
12	2001	Leatherback	2	MAB	990	0	1
13	2001	Leatherback	2	GOM	820	0	1
14	2001	Leatherback	2	GOM	820	0	1
15	2001	Leatherback	2	GOM	800	0	1
16	2001	Leatherback	2	GOM	800	0	1
17	2001	Leatherback	2	GOM	810	0	1
18	2001	Leatherback	2	GOM	796	0	1
19	2001	Leatherback	2	GOM	744	0	1
20	2001	Leatherback	2	GOM	1019	0	1
21	2001	Leatherback	2	GOM	340	0	1
22	2001	Leatherback	2	SAB	1064	0	1
23	2001	Leatherback	2	MAB	1210	0	2
24	2001	Leatherback	2	NEC	790	0	1
25	2001	Leatherback	2	GOM	713	0	1
26	2001	Leatherback	3	NED	480	0	1
27	2001	Leatherback	3	NED	432	0	1
28	2001	Leatherback	3	SAB	230	0	1
29	2001	Leatherback	3	NED	420	0	1
30	2001	Leatherback	3	NED	420	0	1
31	2001	Leatherback	3	NED	420	0	1
32	2001	Leatherback	3	NED	420	0	3
33	2001	Leatherback	3	NED	420	0	1
34	2001	Leatherback	3	NED	420	0	1
35	2001	Leatherback	3	NED	495	0	1
36	2001	Leatherback	3	NED	525	0	1
37	2001	Leatherback	3	NED	525	0	1
38	2001	Leatherback	3	NED	495	0	1
39	2001	Leatherback	3	NED	495	0	1
40	2001	Leatherback	3	NED	495	0	1
41	2001	Leatherback	3	NED	495	0	1
42	2001	Leatherback	3	NED	432	0	1
43	2001	Leatherback	3	NED	432	0	2
44	2001	Leatherback	3	NED	432	0	1
45	2001	Leatherback	3	NED	432	0	1

Table B2 continued

Id #	Year	Species	Quarter	Area	N Hooks	Dead	Alive
46	2001	Leatherback	3	NED	432	0	2
47	2001	Leatherback	3	GOM	812	0	1
48	2001	Leatherback	3	GOM	780	0	1
49	2001	Leatherback	3	GOM	775	0	1
50	2001	Leatherback	3	GOM	774	0	1
51	2001	Leatherback	3	GOM	759	0	1
52	2001	Leatherback	3	GOM	771	0	1
53	2001	Leatherback	3	GOM	784	0	1
54	2001	Leatherback	3	GOM	848	0	1
55	2001	Leatherback	3	NED	480	0	1
56	2001	Leatherback	3	NED	480	0	1
57	2001	Leatherback	3	FEC	432	0	1
58	2001	Leatherback	3	MAB	610	0	1
59	2001	Leatherback	3	NED	492	0	1
60	2001	Leatherback	3	NED	378	0	1
61	2001	Leatherback	3	NED	420	0	1
62	2001	Leatherback	3	NED	420	0	1
63	2001	Leatherback	3	NED	420	0	1
64	2001	Leatherback	3	NED	420	0	1
65	2001	Leatherback	3	NED	420	0	1
66	2001	Leatherback	3	NED	420	0	1
67	2001	Leatherback	3	NED	420	0	1
68	2001	Leatherback	3	SAB	423	0	1
69	2001	Leatherback	3	NED	486	0	1
70	2001	Leatherback	3	NED	469	0	2
71	2001	Leatherback	4	NED	219	0	1
72	2001	Leatherback	4	NED	219	0	1
73	2001	Leatherback	4	NED	432	0	1
74	2001	Leatherback	4	NED	324	0	1
75	2001	Leatherback	4	NED	432	0	1
76	2001	Leatherback	4	NED	420	0	1
77	2001	Leatherback	4	NED	420	0	1
78	2001	Leatherback	4	NED	420	0	1
79	2001	Leatherback	4	NED	420	0	1
80	2001	Leatherback	4	NED	420	0	1
81	2001	Leatherback	4	NED	495	0	1
82	2001	Leatherback	4	NED	495	0	1
83	2001	Leatherback	4	NED	495	0	1
84	2001	Leatherback	4	NED	420	0	1
85	2001	Leatherback	4	NED	420	0	1
86	2001	Leatherback	4	NED	420	0	1
87	2001	Leatherback	4	NED	432	0	1
88	2001	Leatherback	4	NED	405	0	1
89	2001	Leatherback	4	GOM	950	0	1
90	2001	Leatherback	4	GOM	954	0	1

Table B2 continued

Id #	Year	Species	Quarter	Area	N Hooks	Dead	Alive
91	2001	Leatherback	4	NED	480	0	1
92	2001	Leatherback	4	NED	480	0	2
93	2001	Leatherback	4	NED	480	0	1
94	2001	Leatherback	4	NED	432	0	1
95	2001	Leatherback	4	SAB	288	0	1
96	2001	Leatherback	4	NED	432	0	2
97	2001	Leatherback	4	NED	486	0	1
98	2001	Leatherback	4	NED	486	0	1
99	2001	Leatherback	4	NED	486	0	1
100	2001	Leatherback	4	MAB	642	0	1
101	2001	Leatherback	4	NEC	700	0	1
102	2001	Leatherback	4	MAB	700	0	1
103	2001	Leatherback	4	NED	108	0	1
104	2001	Leatherback	4	NED	432	0	1
105	2001	Leatherback	4	NED	432	0	1
106	2001	Leatherback	4	NED	426	0	1
107	2001	Leatherback	4	NED	432	0	1
108	2001	Leatherback	4	NED	420	0	1
109	2001	Leatherback	4	NED	420	0	2
110	2001	Leatherback	4	NED	432	0	1
111	2001	Leatherback	4	NED	432	0	2
112	2002	Leatherback	1	FEC	900	0	1
113	2002	Leatherback	1	FEC	540	0	1
114	2002	Leatherback	1	FEC	1080	0	1
115	2002	Leatherback	1	FEC	360	0	1
116	2002	Leatherback	1	GOM	640	0	1
117	2002	Leatherback	1	GOM	930	0	1
118	2002	Leatherback	1	GOM	952	0	1
119	2002	Leatherback	1	GOM	939	0	1
120	2002	Leatherback	1	FEC	1000	0	1
121	2002	Leatherback	1	FEC	1025	0	2
122	2002	Leatherback	2	FEC	792	0	1
123	2002	Leatherback	2	GOM	820	0	1
124	2002	Leatherback	2	GOM	840	0	1
125	2002	Leatherback	2	GOM	840	0	1
126	2002	Leatherback	2	GOM	976	0	1
127	2002	Leatherback	2	GOM	936	0	1
128	2002	Leatherback	2	GOM	879	0	1
129	2002	Leatherback	2	GOM	874	0	1
130	2002	Leatherback	2	GOM	872	0	1
131	2002	Leatherback	2	GOM	831	0	1
132	2002	Leatherback	2	MAB	550	0	2
133	2002	Leatherback	2	SAB	1225	0	1
134	2002	Leatherback	2	SAB	882	0	1
135	2002	Leatherback	3	NED	819	0	1

Table B2 continued

Id #	Year	Species	Quarter	Area	N Hooks	Dead	Alive
136	2002	Leatherback	3	NED	936	0	3
137	2002	Leatherback	3	NED	936	0	1
138	2002	Leatherback	3	NED	702	0	2
139	2002	Leatherback	3	NED	939	0	1
140	2002	Leatherback	3	NED	876	0	1
141	2002	Leatherback	3	NED	876	0	1
142	2002	Leatherback	3	NED	876	0	1
143	2002	Leatherback	3	NED	720	0	1
144	2002	Leatherback	3	NED	945	0	1
145	2002	Leatherback	3	NED	945	0	1
146	2002	Leatherback	3	NED	945	0	1
147	2002	Leatherback	3	NED	976	0	3
148	2002	Leatherback	3	NED	1002	0	1
149	2002	Leatherback	3	NED	1026	0	1
150	2002	Leatherback	3	NED	1023	0	1
151	2002	Leatherback	3	NED	987	0	1
152	2002	Leatherback	3	NED	1092	0	1
153	2002	Leatherback	3	NED	819	0	1
154	2002	Leatherback	3	NED	858	0	2
155	2002	Leatherback	3	NED	936	0	1
156	2002	Leatherback	3	NED	936	0	1
157	2002	Leatherback	3	NED	936	0	1
158	2002	Leatherback	3	NED	936	0	1
159	2002	Leatherback	3	NED	936	0	1
160	2002	Leatherback	3	NED	936	0	2
161	2002	Leatherback	3	NED	1080	0	1
162	2002	Leatherback	3	NED	1080	0	1
163	2002	Leatherback	3	NED	1080	0	1
164	2002	Leatherback	3	NED	1050	0	1
165	2002	Leatherback	3	NED	1002	0	2
166	2002	Leatherback	3	NED	918	0	3
167	2002	Leatherback	3	NED	864	0	2
168	2002	Leatherback	3	NED	756	0	1
169	2002	Leatherback	3	NED	882	0	1
170	2002	Leatherback	3	NED	966	0	1
171	2002	Leatherback	3	NED	826	0	2
172	2002	Leatherback	3	NED	708	0	1
173	2002	Leatherback	3	NED	1089	0	1
174	2002	Leatherback	3	NED	891	0	1
175	2002	Leatherback	3	NED	969	0	1
176	2002	Leatherback	3	NED	972	0	1
177	2002	Leatherback	3	NED	911	0	1
178	2002	Leatherback	3	NED	972	0	2
179	2002	Leatherback	3	GOM	950	0	1
180	2002	Leatherback	3	GOM	940	0	1

Table B2 continued

Id #	Year	Species	Quarter	Area	N Hooks	Dead	Alive
181	2002	Leatherback	3	GOM	950	0	1
182	2002	Leatherback	3	GOM	910	0	1
183	2002	Leatherback	3	NED	330	0	1
184	2002	Leatherback	3	NED	390	0	1
185	2002	Leatherback	3	NED	920	0	2
186	2002	Leatherback	3	NED	910	0	2
187	2002	Leatherback	3	NED	945	0	4
188	2002	Leatherback	3	NED	701	0	1
189	2002	Leatherback	3	NED	937	0	1
190	2002	Leatherback	3	GOM	605	0	2
191	2002	Leatherback	3	GOM	550	1	0
192	2002	Leatherback	3	GOM	521	0	2
193	2002	Leatherback	3	GOM	909	0	1
194	2002	Leatherback	3	NED	972	0	2
195	2002	Leatherback	3	NED	972	0	2
196	2002	Leatherback	3	NED	969	0	1
197	2002	Leatherback	3	NED	921	0	4
198	2002	Leatherback	3	NED	969	0	1
199	2002	Leatherback	3	NED	981	0	1
200	2002	Leatherback	3	NED	795	0	1
201	2002	Leatherback	3	NED	900	0	1
202	2002	Leatherback	3	NED	948	0	1
203	2002	Leatherback	3	NED	912	0	1
204	2002	Leatherback	3	NED	890	0	1
205	2002	Leatherback	3	NED	864	0	2
206	2002	Leatherback	3	NED	913	0	1
207	2002	Leatherback	3	NED	962	0	1
208	2002	Leatherback	3	NED	600	0	1
209	2002	Leatherback	3	NED	960	0	1
210	2002	Leatherback	3	NED	902	0	1
211	2002	Leatherback	3	NED	918	0	1
212	2002	Leatherback	3	NED	915	0	1
213	2002	Leatherback	3	NED	840	0	2
214	2002	Leatherback	3	NED	873	0	1
215	2002	Leatherback	3	NED	828	0	1
216	2002	Leatherback	3	NED	825	0	3
217	2002	Leatherback	3	NED	897	0	3
218	2002	Leatherback	3	NED	903	0	1
219	2002	Leatherback	3	NED	801	0	1
220	2002	Leatherback	3	NED	801	0	1
221	2002	Leatherback	3	NED	801	0	1
222	2002	Leatherback	3	NED	801	0	1
223	2002	Leatherback	3	NED	853	0	1
224	2002	Leatherback	3	NED	853	0	1
225	2002	Leatherback	3	NED	853	0	1

Table B2 continued

Id #	Year	Species	Quarter	Area	N Hooks	Dead	Alive
226	2002	Leatherback	3	NED	853	0	1
227	2002	Leatherback	3	NED	853	0	1
228	2002	Leatherback	3	NED	895	0	2
229	2002	Leatherback	3	NED	1104	0	2
230	2002	Leatherback	3	NED	1125	0	1
231	2002	Leatherback	3	NED	1089	0	1
232	2002	Leatherback	3	NED	625	0	1
233	2002	Leatherback	3	NED	625	0	1
234	2002	Leatherback	4	NED	936	0	1
235	2002	Leatherback	4	NED	936	0	1
236	2002	Leatherback	4	NED	936	0	1
237	2002	Leatherback	4	NED	852	0	2
238	2002	Leatherback	4	NED	936	0	1
239	2002	Leatherback	4	NED	936	0	1
240	2002	Leatherback	4	NED	936	0	1
241	2002	Leatherback	4	NED	720	0	1
242	2002	Leatherback	4	NED	765	0	1
243	2002	Leatherback	4	NED	960	0	1
244	2002	Leatherback	4	NED	957	0	1
245	2002	Leatherback	4	NED	984	0	1
246	2002	Leatherback	4	NED	957	0	1
247	2002	Leatherback	4	NED	927	0	1
248	2002	Leatherback	4	MAB	948	0	1
249	2002	Leatherback	4	MAB	924	0	1
250	2002	Leatherback	4	NED	972	0	1
251	2002	Leatherback	4	NED	864	0	1
252	2002	Leatherback	4	NED	930	0	1
253	2002	Leatherback	4	NED	1125	0	1
254	2002	Leatherback	4	NED	1125	0	1
255	2002	Leatherback	4	MAB	666	0	1
256	2002	Leatherback	4	GOM	920	0	1
257	2002	Leatherback	4	GOM	620	0	1
258	2002	Leatherback	4	GOM	765	0	2
259	2002	Leatherback	4	GOM	575	0	1
260	2002	Leatherback	4	NED	630	0	1
261	2002	Leatherback	4	NED	810	0	1
262	2002	Leatherback	4	NED	810	0	1
263	2002	Leatherback	4	NED	972	0	1
264	2002	Leatherback	4	NED	972	0	1
265	2002	Leatherback	4	NED	954	0	1
266	2002	Leatherback	4	NED	864	0	1
267	2002	Leatherback	4	NED	774	0	1
268	2002	Leatherback	4	NED	696	0	1
269	2002	Leatherback	4	NED	864	0	1

Table B2 continued

Id #	Year	Species	Quarter	Area	N Hooks	Dead	Alive
271	2002	Leatherback	4	NED	822	0	1
272	2002	Leatherback	4	NED	960	0	1
273	2002	Leatherback	4	NED	786	0	1
274	2002	Leatherback	4	NED	786	0	2
275	2002	Leatherback	4	NED	876	0	1
276	2001	Loggerhead	1	MAB	768	0	1
277	2001	Loggerhead	1	SAB	840	1	0
278	2001	Loggerhead	1	CAR	1000	0	1
279	2001	Loggerhead	2	NCA	825	0	1
280	2001	Loggerhead	2	NCA	864	0	1
281	2001	Loggerhead	2	NEC	835	0	1
282	2001	Loggerhead	3	NED	480	0	1
283	2001	Loggerhead	3	NED	480	0	1
284	2001	Loggerhead	3	NED	441	0	2
285	2001	Loggerhead	3	NED	420	0	2
286	2001	Loggerhead	3	NED	420	0	1
287	2001	Loggerhead	3	NED	420	0	2
288	2001	Loggerhead	3	NED	420	0	1
289	2001	Loggerhead	3	NED	420	0	3
290	2001	Loggerhead	3	NED	63	0	1
291	2001	Loggerhead	3	NED	495	0	1
292	2001	Loggerhead	3	NED	555	0	1
293	2001	Loggerhead	3	NED	495	0	1
294	2001	Loggerhead	3	NED	495	0	1
295	2001	Loggerhead	3	NED	495	0	2
296	2001	Loggerhead	3	NED	495	0	1
297	2001	Loggerhead	3	NED	495	0	2
298	2001	Loggerhead	3	NED	495	0	3
299	2001	Loggerhead	3	NED	495	0	1
300	2001	Loggerhead	3	NED	495	0	2
301	2001	Loggerhead	3	NED	495	0	2
302	2001	Loggerhead	3	NED	495	0	1
303	2001	Loggerhead	3	NED	495	0	1
304	2001	Loggerhead	3	NED	432	0	1
305	2001	Loggerhead	3	NED	432	0	1
306	2001	Loggerhead	3	NED	495	0	4
307	2001	Loggerhead	3	NED	432	0	1
308	2001	Loggerhead	3	NEC	685	0	1
309	2001	Loggerhead	3	NED	420	0	1
310	2001	Loggerhead	3	NED	486	0	1
311	2001	Loggerhead	3	NED	486	0	1
312	2001	Loggerhead	3	NED	486	0	2
313	2001	Loggerhead	4	NED	432	0	1
314	2001	Loggerhead	4	NED	324	0	2
315	2001	Loggerhead	4	NED	420	0	1

Table B2 continued

Id #	Year	Species	Quarter	Area	N Hooks	Dead	Alive
316	2001	Loggerhead	4	NED	420	0	2
317	2001	Loggerhead	4	NED	420	0	2
318	2001	Loggerhead	4	NED	420	0	1
319	2001	Loggerhead	4	NED	495	0	1
320	2001	Loggerhead	4	NED	495	0	1
321	2001	Loggerhead	4	NED	495	0	1
322	2001	Loggerhead	4	NED	495	0	2
323	2001	Loggerhead	4	NED	495	0	21
324	2001	Loggerhead	4	NED	495	0	8
325	2001	Loggerhead	4	NED	420	0	1
326	2001	Loggerhead	4	NED	420	0	1
327	2001	Loggerhead	4	NED	420	0	1
328	2001	Loggerhead	4	NED	432	0	2
329	2001	Loggerhead	4	NED	432	0	2
330	2001	Loggerhead	4	NED	432	0	1
331	2001	Loggerhead	4	NED	432	0	1
332	2001	Loggerhead	4	NED	432	0	1
333	2001	Loggerhead	4	NED	432	0	1
334	2001	Loggerhead	4	NED	432	0	1
335	2001	Loggerhead	4	NED	432	0	1
336	2001	Loggerhead	4	NED	432	0	1
337	2001	Loggerhead	4	NED	480	0	1
338	2001	Loggerhead	4	NED	432	0	2
339	2001	Loggerhead	4	NED	480	0	1
340	2001	Loggerhead	4	NED	480	0	2
341	2001	Loggerhead	4	NED	384	0	1
342	2001	Loggerhead	4	SAB	396	0	1
343	2001	Loggerhead	4	NED	432	0	3
344	2001	Loggerhead	4	NED	432	0	11
345	2001	Loggerhead	4	NED	432	0	3
346	2001	Loggerhead	4	NED	486	0	1
347	2001	Loggerhead	4	NED	486	0	1
348	2001	Loggerhead	4	NED	432	0	1
349	2001	Loggerhead	4	NED	432	0	1
350	2001	Loggerhead	4	NED	432	0	1
351	2001	Loggerhead	4	MAB	700	0	1
352	2001	Loggerhead	4	NED	432	0	1
353	2001	Loggerhead	4	NED	420	0	6
354	2001	Loggerhead	4	NED	420	0	4
355	2002	Loggerhead	1	CAR	736	0	1
356	2002	Loggerhead	1	CAR	684	0	1
357	2002	Loggerhead	1	FEC	864	0	1
358	2002	Loggerhead	1	FEC	900	0	2
359	2002	Loggerhead	1	MAB	1100	0	1
360	2002	Loggerhead	1	MAB	800	0	1

Table B2 continued

Id #	Year	Species	Quarter	Area	N Hooks	Dead	Alive
361	2002	Loggerhead	1	FEC	1080	0	1
362	2002	Loggerhead	1	FEC	360	0	1
363	2002	Loggerhead	1	FEC	1000	0	1
364	2002	Loggerhead	1	FEC	1004	0	1
365	2002	Loggerhead	2	FEC	925	0	1
366	2002	Loggerhead	2	NEC	605	0	1
367	2002	Loggerhead	2	NEC	765	0	1
368	2002	Loggerhead	2	NEC	445	0	2
369	2002	Loggerhead	2	NEC	550	0	1
370	2002	Loggerhead	2	NEC	600	0	1
371	2002	Loggerhead	2	GOM	840	0	1
372	2002	Loggerhead	2	GOM	840	0	1
373	2002	Loggerhead	2	GOM	840	0	1
374	2002	Loggerhead	2	GOM	883	0	1
375	2002	Loggerhead	2	GOM	872	0	1
376	2002	Loggerhead	3	NED	936	0	1
377	2002	Loggerhead	3	NED	936	0	1
378	2002	Loggerhead	3	NED	927	0	2
379	2002	Loggerhead	3	NED	1029	0	1
380	2002	Loggerhead	3	NED	1023	0	1
381	2002	Loggerhead	3	NED	1023	0	1
382	2002	Loggerhead	3	NED	987	0	1
383	2002	Loggerhead	3	NED	936	0	2
384	2002	Loggerhead	3	NED	1080	0	2
385	2002	Loggerhead	3	NED	1080	0	1
386	2002	Loggerhead	3	NED	918	0	1
387	2002	Loggerhead	3	NED	540	0	1
388	2002	Loggerhead	3	NED	918	0	1
389	2002	Loggerhead	3	NED	882	0	1
390	2002	Loggerhead	3	NED	973	0	1
391	2002	Loggerhead	3	GOM	950	0	1
392	2002	Loggerhead	3	NED	210	0	1
393	2002	Loggerhead	3	NED	921	0	1
394	2002	Loggerhead	3	NED	984	0	1
395	2002	Loggerhead	3	NED	972	0	1
396	2002	Loggerhead	3	NED	969	0	1
397	2002	Loggerhead	3	NED	972	0	4
398	2002	Loggerhead	3	NED	948	0	1
399	2002	Loggerhead	3	NED	913	0	1
400	2002	Loggerhead	3	NED	909	0	2
401	2002	Loggerhead	3	NED	922	0	1
402	2002	Loggerhead	3	NED	962	0	1
403	2002	Loggerhead	3	NED	918	0	1
404	2002	Loggerhead	3	NED	897	0	1
405	2002	Loggerhead	3	NED	744	0	3

Table B2 continued

Id #	Year	Species	Quarter	Area	N Hooks	Dead	Alive
406	2002	Loggerhead	3	NED	768	0	1
407	2002	Loggerhead	3	NED	789	0	3
408	2002	Loggerhead	3	NED	954	0	1
409	2002	Loggerhead	3	NED	1098	0	1
410	2002	Loggerhead	4	NED	936	0	3
411	2002	Loggerhead	4	NED	819	0	1
412	2002	Loggerhead	4	NED	936	0	1
413	2002	Loggerhead	4	NED	759	0	1
414	2002	Loggerhead	4	NED	720	0	6
415	2002	Loggerhead	4	NED	759	0	1
416	2002	Loggerhead	4	NED	975	0	2
417	2002	Loggerhead	4	NED	993	0	2
418	2002	Loggerhead	4	NED	996	0	2
419	2002	Loggerhead	4	NED	972	0	1
420	2002	Loggerhead	4	NED	927	0	2
421	2002	Loggerhead	4	NED	849	0	1
422	2002	Loggerhead	4	MAB	948	0	1
423	2002	Loggerhead	4	MAB	928	0	1
424	2002	Loggerhead	4	NED	1089	0	1
425	2002	Loggerhead	4	NED	1125	0	1
426	2002	Loggerhead	4	NED	1125	0	1
427	2002	Loggerhead	4	NED	1125	0	4
428	2002	Loggerhead	4	NED	1125	0	1
429	2002	Loggerhead	4	NED	1125	0	2
430	2002	Loggerhead	4	MAB	720	0	1
431	2002	Loggerhead	4	MAB	680	0	1
432	2002	Loggerhead	4	MAB	746	0	1
433	2002	Loggerhead	4	GOM	950	0	1
434	2002	Loggerhead	4	NED	810	0	8
435	2002	Loggerhead	4	NED	954	0	1
436	2002	Loggerhead	4	NED	774	0	1
437	2002	Loggerhead	4	NED	696	0	1
438	2002	Loggerhead	4	NED	864	0	5
439	2002	Loggerhead	4	NED	822	0	2
440	2002	Loggerhead	4	CAR	816	0	2
441	2002	Loggerhead	4	NED	786	0	1
442	2002	Loggerhead	4	NED	786	0	1
443	2002	Loggerhead	4	NED	876	0	1
444	2002	Loggerhead	4	NED	786	0	2
445	2002	Un-identified	2	GOM	840	0	1
446	2002	Un-identified	4	GOM	830	0	1